

Keynes's 1905 Exercise Papers with Marshall's Annotations

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Introduction

Keynes's 16 exercise papers², with Marshall's corrections and comments, afford a unique opportunity to gain access into a decisive episode in the training of the former - who was taking his first steps towards economics with youthful confidence, supported by his logical and mathematical expertise, and into the teaching style of the latter - the mature economist who, impressed by the potentialities of the young student, profusely dispensed warnings and encouragements with the intent of leading him onto the right track. The outcome is an ongoing dialogue, which does not always end with the professor's annotations and overall judgment: twice it goes on with supplementary answers that take into account Marshall's former criticisms and comments, and which are in their turn annotated³. Moreover, a Keynesian text commented upon by the professor leads to an invitation to a private talk on the subject, namely index numbers.⁴

In the article 'Keynes's apprenticeship with Marshall' (2000), I dealt with the main aspects of this dialogue, in particular with Marshall's self-imposed task of curbing Keynes's confidence in his mathematics to bring him into contact with the real world. I thought it appropriate to reproduce the article by way of introduction to the papers.⁵ Let me add, as a concluding remark, that the general drift of Marshall's 'red-ink comments and criticisms [that] occupy almost as much space as my answers' - as Keynes would write in the obituary - is captured by Maynard's letter to Lytton Strachey of 23 November 1905: 'Marshall is continually pestering

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2 Indeed, 15 are those annotated by Marshall, and this number is given in the article here reproduced in which the papers were presented and discussed. Of the other two questions which are mentioned therein, one is followed by what looks to be Keynes's answer, though it bears no sign of Marshall's reading. This paper is likewise transcribed here. As the papers are clearly ordered by date of composition and question numbers, the paper is identified as 9.11.05 question 5.

3 The two supplementary answers are to questions on capital (18.10.05, question 3) and index numbers (31.10.05, question 5). The latter, together with the supplementary answer, was transferred by Keynes into what is now rubricated under IN (Keynes Papers), which contains the material he used while preparing the essay 'The Method of Index Numbers with Special Reference to the Measurement of General Exchange Value' (1909, in CW, XI pp. 49-156). Another paper removed from the location where all the other 14 papers are preserved (UA/3/2) is the paper on money (undated, question 6), which forms part of the material Keynes used for his lectures on money (UA/6/1).

4 The fragment with Marshall's comments was not transferred to IN but was left in UA/3/2. The fragment bears no date.

5 I wish to thank *History of Economic Ideas* for permission to reproduce the article. Italics in quotations from Keynes and Marshall correspond to underlined words in the manuscript.

me to turn professional economist and writes flattering remarks on my papers to help on the good cause'. Marshall's strategy worried Maynard's father, who was pushing his son to a career in the Civil Service. On 26 November John Neville's diary bears witness to his fear that the strategy could be successful: 'He [Maynard] does a great deal of work for Marshall, who described some of his answers as brilliant. I am afraid Marshall is endeavouring to persuade him to give up everything for economics'.⁶ Marshall's insistence is confirmed in a letter to John Neville, transcribed in the latter's diary a week later: 'Your son is doing excellent work in economics. I have told him that I should be greatly delighted if he should decide on the career of a professional economist. But of course I must not press him.' In the end, Maynard gave up the idea of taking the Economics Tripos, and wrote to Marshall, who took notice of the decision in his letter of 2 May 1906: 'I was very sorry to get your letter this morning. But I must not urge you further'. He had to wait till 1908 to enrol Keynes in the economic profession.⁷

In the text, Marshall's comments are reproduced in the footnotes. Square brackets include editorial additions, unless otherwise stated, or when they are used in mathematical formulae.

6 Maynard's letter and John Neville's annotation are reproduced by Moggridge (p. 96) in his biography of Keynes, and the letter in Skidelsky's biography (vol. 1 p. 166) (see bibliographical references at the end of the reproduced article). Maynard's letter to Strachey matches Marshall's comment on the index numbers paper of 31 October; 'brilliant' is the comment on the paper comparing different railway services.

7 See Whitaker's correspondence (III, p. 135-36) for both letters.

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KEYNES'S APPRENTICESHIP WITH MARSHALL IN 1905

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The article deals with Keynes's economic apprenticeship with Marshall in the Autumn of 1905. After detailing Keynes's readings in economics, it focuses attention on the 15 papers he wrote in answer to Marshall's questions. The papers, full of Marshall's "red ink" corrections and comments, reveal the existence of a fascinating dialogue between master and pupil which still deserves investigation. A review of their contents, ranging from the definition of capital to method of index numbers, use of mathematical symbols, business size, monopolistic pricing and railway services, provides a unique opportunity to enter Marshall's laboratory and have a close-up view of the beginning of Keynes's controversial "career as an economist". It also shows that many of Keynes's later attitudes to methodological issues were rooted in his Marshallian background.

1. The main characters in context

This paper concentrates on a very narrow span of time in the autumn of 1905, when Marshall's lectures, and related activities, were attended by the young Keynes. The episode provides a lively picture of Keynes's apprenticeship in his master's laboratory. Marshall's lecturing style has drawn much attention¹ and it is well-known that he preferred extempore rather than rigorous lecturing, as the latter tends to become fixed and routine². The gulf between this mode of lecturing and the requirements of

* The author is glad to thank Marco Dardi for his helpful advice. A first version of the paper was presented at the Second European Conference on the History of Economic Thought, Lisbon, 8-10 February 1996, where it benefited from comments by Henry Landreth and Peter Groenewegen. Of course, the usual disclaimer applies. A shortened Italian version was published in *Rivista Italiana degli Economisti*, 1, 1996. I am also grateful to the staff of the Biblioteca della Facoltà di Economia di Modena for their help and assistance in the consultation of the microfilms of *Keynes Papers*.

1. Cf. GROENEWEGEN (1990 and 1995a, chapter 10) and MACWILLIAMS TULLBERG (1993).

2. "Some people say that books have superseded oral teaching, at all events

writing, together with impatience at the rigidity of written words, can be listed among the causes of the non-completion of his main book. Keynes hints at something similar when he states that the unsystematic character of Marshall's lectures

"may have contributed, incidentally, to the retardation of his published work. But the sharp distinction which he favoured between written instruction by book and oral instruction by lecture was, as he developed it, extraordinarily stimulating for the better men and where the class was not too large".

(Keynes 1925, p. 51)³

Marshall's method of teaching was "to make the students *think with him*" (Keynes 1925, p. 51) or, as he wrote (1894, p. 381), to "get [their minds] to work in swing with his", inviting them to see by themselves the way in which a "trained teacher" thinks, because "the best way to learn to row is to row behind a man who is already trained"⁴. Lectures were supplemented by "personal advice" in the six hours a week Marshall was "at home" for students who usually left his house "labouring under more books ... than [they] could well carry", "staggering under an armload of books"⁵.

Another practice commonly adopted by this "unique teacher" (Benians 1925, p. 80) was to set papers and discuss the answers at length. As Marshall's wife was later to remember,

"he gave questions once a week on a part of the subject which he had

for able students; I don't think they have. But I think able students are injuriously treated when a chapter of a book is spoken at them. It ought to be printed, and given to them to read quietly" (MARSHALL 1894, p. 381). "He never gave routine lectures to make the path easier. Under some blanket title, he talked, with complete discontinuity between one lecture and another, on any matter of economic interest that had occurred to him on the way to his class, or that the morning paper had suggested" (MACGREGOR, 1942, p. 313).

3. BENIANS (1925, p. 80) confirms that Marshall's style of lecturing was "always stimulating" and MACGREGOR (1942, p. 313) writes that Marshall "thought the purpose of a lecture was to stimulate the interest" of the students.

4. In his biographical essay, Keynes insists on the informal elements of Marshall's teaching and the danger that a superficial reader of the *Principles* "like a duck leaving water, ... can escape from this douche of ideas with scarce a wetting" (KEYNES, 1925 p. 48).

5. MARSHALL (1894, p. 381); KEYNES (1925, p. 58); FAY (1925, p. 75).

not lectured over, and then answered the questions in class. He took immense pains in looking over the answers, and used red ink on them freely"⁶.

Marshall's red ink annotations "as long as the student's answer" were full of "humorous criticism, generous praise, sweeping censure" and "devastating" criticism⁷.

Thanks to Keynes's scrupulous preservation of his papers, fifteen of such exercises are extant in the *Keynes Papers*⁸. The 180 or so red ink annotations by Marshall can help us to form an idea of Marshall's teaching style⁹. The whole conveys the impression of a written dialogue between master and pupil, as the papers – written in little more than a month (from 18 October to 23 November) – are closely interconnected, revealing an internal history of their own. Sometimes Marshall refers to subjects to be dealt with later in lectures and stimulates Keynes's interest in further discussion by hinting at the vast material which in 1905 he still envisaged as part of volume II of the *Principles*¹⁰. Moreover, two papers are followed by Keynes's supplementary answers that carefully consider Marshall's comments and in their turn are newly annotated.

Before discussing these papers and related material, it is also helpful to place the episode in the context of Keynes's intellectual biography. At that time his main interests were undoubtedly philosophical: fascinated by Moore's *Principia Ethica*¹¹, he was heavily involved with "organic unities" and "mental states". Indeed, struck by the "curious connection between

6. From Mary Paley's notes for Keynes's obituary of Marshall (KEYNES 1925, p. 51).

7. PIGOU (1925, p. 87); BENIANS (1925, p. 80) and Lynda Grier's notes (MACWILLIAMS TULLBERG 1993).

8. The *Keynes Papers* are now easily available thanks to the excellent microfilm edition and the detailed dialogue accompanying it (*A Catalogue of the papers of John Maynard Keynes in King's College Library; Cambridge, Chadwick-Healey, Ltd., Cambridge, 1995*).

9. Their impact was vividly recorded by Keynes almost twenty years later, while writing the obituary of his teacher: "I have papers which I wrote for him on which his red-ink comments and criticisms occupy almost as much space as my answers" (KEYNES, 1925, p. 51, n. 1).

10. On the missed completion of *Principles*, see WHITAKER (1990).

11. But, in 1905, probably still experiencing a certain dissatisfaction with Moore, before being converted again to Moorism. (BATEMAN 1996).

'probable' and 'ought'¹², he was planning a work which, begun as a fellowship dissertation, was to become the *Treatise on Probability*¹³.

Keynes began to study economics in the second half of June 1905. Early that month, he had passed the Mathematical Tripos as twelfth wrangler and was then ready to fill in his gaps in the other subjects required of would-be Civil Servants. June and July were devoted to reading "masses of economics", as he wrote to Strachey on 8 July. When summer came, the calling of philosophy brought a halt to Keynes's economic studies. The whole of August was spent on holidays during which Keynes's intellectual energies were newly absorbed by Moore's *Principia Ethica*¹⁴. However, economics must have left a trace if, back from his Continental tour, he wrote to Hobhouse that he was undecided whether to plunge himself into the study of philosophy or economics¹⁵. Considerations of personal preference were to harmonize with his father's cooler appreciation of the worth of a proper training and formal examination in either discipline for his son's career (Skidelsky 1983, p. 162). After a new and shorter holiday in the last fortnight of September, Keynes was ready to continue with economics and to resume study of this field under Marshall's guidance. On 12 October he filled out an entry for Marshall's Michaelmas term lectures, listing the economic books he had read¹⁶. Towards the beginning of De-

12. The expression is in a note dated 31 July in *Miscellanea Ethica* (MOGGRIDGE 1992, p. 134).

13. The first surviving scheme of the work bears the date 5 September 1905.

14. *Miscellanea Ethica* are loose notes written at various dates between 31 July and 19 September.

15. Keynes to A.L. Hobhouse, 3.9.1905, quoted in SKIDELSKY (1983, p. 162).

16. The list, reproduced by GROENEWEGEN (1988, p. 667) and MOGGRIDGE (1992, p. 95), is as follows:

"Marshall – *Principles of Economics, Pure Theory of Foreign Trade, Pure Theory of Domestic Values*, *Miscellanea*; Jevons – *Principles of Political Economy, Investigations in Currency and Finance, Money*; Bowley – *Elements of Statistics*; Cassel – *Nature and Necessity of Interest*; Bagehot – *Lombard Street*; Toynbee – *Industrial Revolution*; Cournot – *Principes Math. des Richesses*; sundry articles on Cournot; Bastable – *International Trade, Public Finance*; Ricardo – *Principles of Political Economy*; Nicholson – *Principles of Political Economy*, vol. I; Goschen – *The Foreign Exchanges*; Clare – *A.B.C. of Foreign Exchanges*; Keynes – *Scope and*

center he stopped studying economics and by Christmas he had moved on to psychology¹⁷. Moreover, during this period he by no means gave up his philosophical interests as he wrote at least one paper on *Modern Civilisation*, read at *The Apostles* on 28 October, and read a second one, *A Theory of Beauty*, at the *Dickinson Philosophical Society* on 8 November¹⁸.

Autumn 1905 was therefore a crucial period in Keynes's economic studies and his overall intellectual evolution, a fact which invites enquiry on the place economics held in his mind at that time. His two main biographers express different views on this subject. According to Skidelsky, Keynes's almost exclusive concern for philosophy affords historical explanation of his hasty training in economics:

"his main intellectual preoccupation was still moral philosophy ... his total professional training came to little more than eight weeks. All the rest was learnt on the job".

(Skidelsky 1983, pp. 162 and 166; cf. also p. 206)

Skidelsky considers Keynes's decision to give up the Economics Tripos as further proof that his main interests were philosophical. This story seems to vindicate the remarks of Shove who, according to Joan Robinson (1964, p. 80), "used to say that Maynard [Keynes] had never spent the twenty minutes necessary to understand the theory of value", and later on of Hayek, who, less innocently, suggested that Keynes's hasty training in economics could be the culprit of Keynes's failure to grasp the core of the economic system (Hayek 1978, pp. 284-85).

By contrast, Moggridge (1992, p. 95) writes that Keynes's penchant for economics was strong from the beginning: indeed Keynes was certainly interested in philosophy but did not follow this inclination either, whereas he could have proceeded

Method; Edgeworth – articles on the incidence of urban taxation, the theory of international values, the pure theory of taxation and index numbers; Pierson – articles on index numbers; Darwin – *Bimetallism*".

17. SKIDELSKY (1983, p. 167). Keynes's notes on Sully and Stout bear the date "December 1905" (*Keynes Papers*, UA/4/2/1 and UA/4/3/1).

18. *A Theory of Beauty* was mainly written in August. The dates when the two papers were read are given by Keynes in letters to L. Strachey of 29 October and 12 November.

with the Moral Sciences Tripos which, like the Economics Tripos, "would have been useful for the Civil Service examinations". Moggridge notices that after all the Economics Tripos was given preference, though for a test that never took place. Moreover, although in the end Keynes did not proceed with the Tripos and gave up the idea of preparing for it – an idea that Marshall was still pressing on him as late as 2 May 1906 (Moggridge 1992, p. 97) – he went on attending Marshall's Lent term lectures on money.

Not unusually, there are two sides to this issue¹⁹. To evaluate the motives that produced Keynes's final decisions, his father's influence must be taken into account. Though difficult to assess, its strength is certain and tips the scales in Moggridge's favour since John Neville Keynes's worries over Marshall's insistence (Moggridge 1992, p. 96) suggest he feared it was not falling on deaf ears and his diary shows clear signs of relief when his son abandoned economic studies. This caring father must have spent a more relaxing Christmas in 1905 than four years later, when his son's decision was reversed and the certainties of a career in the Civil Service were exchanged for the uncertainties of an academic career, a resolution on which Marshall's offer of a lectureship had some influence.

Even more interesting than the *quantity* is the *type* of economics that Keynes learned. From his lecture notes, books excerpts, comments and, above all, from the papers he wrote for Pigou and Marshall, it emerges that Keynes's apprenticeship was truly special, with much time devoted to applied economics: transport, financial and stock markets and industrial organization. Adding statistical data and monetary economics to the list, we have a glimpse of the tight interdependence between abstract theorizing and historical knowledge that characterizes Marshall's method and explains his impatience with abstract problems of no practical relevance – with "toys", as he used to define purely academic exercises.

2. A glimpse at the Keynes's Archives material on his early economic studies

The main material in the *Keynes Papers* through which

19. GROENEWEGEN (1993, pp. 24-25) appears to take sides with Moggridge on this issue.

Keynes's economic studies can be examined are the sheets of paper now catalogued under UA/3, part of the notes on the theory of money that form item UA/6/3, part of those on index numbers catalogued under IN/2 and an essay on index numbers in IN/1.

Most of the manuscript pages of UA/3/2 consist of quotations from economic texts, arranged under the headings of pure economics, capital, public finance, taxation, trusts and railways (I) and modern business methods (II) (trusts and railways being part I of them)²⁰. A reading list is given for every subject, usually placed before the quotations by way of an index, and arranged in a selective way under topical sub-headings²¹. Notes from Marshall's Michaelmas lectures are also preserved. Their subjects range from economics and mathematics to industry and trade, producers' surplus and quasi-rent, measurement of total utility, Malthus and emigration, houseroom price²². There are also scattered pages of original work – always in mathematical economics.

The envelope on pure economics opens with a few pages of notes of Marshall's lectures followed by notes from Marshall's *Theory of Foreign Trade* and *Theory of Domestic Values*, F.Y. Edgeworth's *Theory of International Values*, A. Cournot's *Principes Mathematiques* and W.S. Jevons's *Political Economy*, the last in particular on value, utility and the theory of wages. Notes on statistical issues, such as averages, are taken mainly from A.L. Bowley's *Elements of Statistics* with occasional notes from Jevons's *Investigations in Currency and Finance*, Marshall's *Graphic Method of Statistics* and Edgeworth. A few pages contain Keynes's original notes on elasticity, a tax on monopoly, the theory of labour remuneration and consumer's rent.

20. SKIDELSKY (1983, ch. 7) lists only four subjects as he does not mention public finance and modern business methods.

21. Even though we consider only the books from which notes were taken, these lists are much wider than the one Keynes gave to Marshall on 12 October 1905. Some of the new books were certainly later readings. Conversely, there are books and articles that Keynes included in the list for Marshall but that do not appear in his economic notes.

22. A comment on these lecture notes is now in GROENEWEGEN (1995a, p. 554).

Capital is the title of another large set of notes. The lion's share is here taken by G. Cassel's *Nature and Necessity of Interest*, with many pages devoted to Cassel's history of the discussion on capital and interest, while theoretical considerations are supplemented with a few notes from Ricardo and Jevons.

A large historical section also forms part of the notes on **trusts and railways**. Keynes's reading list has J.P. Norton's and H.C. Adam's articles in the third series of the *American Economic Association*, J.B. Clark's *Control of Trusts*, J.W. Jenks's *Trust Problem*, Marshall's *Some Aspects of Competition*, A.T. Hadley's *Railroad Transportation*, T.L. Greene's *Corporation Finance*, F.H. Spearman's *Strategy of Great Railways*, E.R. Johnson's *American Railway Transportation* and C.F. Bastable's *Public Finance*.

The notes on **modern business methods** come almost exclusively from H.C. Emery's *Speculation on the Produce and Stock Exchanges of the United States*. T. Veblen's *Theory of Business Enterprise* and R.M. Hurd's *Principles of City Land Values* are also listed.

Public finance is composed of notes from Bastable's *Public Finance*. This book, Edgeworth's articles in the *Economic Journal*, "Pure theory of taxation" (1907) and "Incidence of urban rates" (1910), together with A. Hook's article on "The present position of the land tax" (*Economic Journal*, 1905), are the sources of Keynes's notes on **taxation**.

Thirteen of Keynes's fifteen papers are preserved in UA/3/2, together with an undated fragment on index numbers. The envelopes also contain lists of questions for the Tripos examinations of 1905. Some of these were answered by Keynes in two exercise papers on the questions set in Political Economy, part II and III, on 24 and 25 May 1905. They form the separate item UA/3/1. Pigou's corrections, rather 'dry' and professional, are sometimes difficult to read. These exercise papers are undated but were probably written in the summer or autumn of 1905. They show a good mastery of Marshall's theory of international values²³ and of issues relating to monopoly and taxation.

23. This seems to be the subject on which Keynes's studies were more thorough from the beginning. It is listed in the entry for Marshall's lectures as one

The notes on **money**, now in UA/6/3, originally similar to the others, were rearranged in 1909, when Keynes used them to lecture on money after his first academic appointment. However, it may be taken for certain that notes from Marshall's evidence before the *Gold and Silver Commission* and the *Indian Currency Committee*, as well as from J. E. Cairnes's *Essays towards a solution of the gold question* and Jevons's *Investigations*, were taken in 1905. Keynes's notes on Marshall's lectures are dated "January 1906". UA/6/3 contains also the undated paper on Adam Smith's tax on coinage.

Keynes's early notes on the economic applications of **index numbers** are preserved in IN/2. They start with notes from Marshall's lectures, followed by a reading list and notes taken from Edgeworth's *Memorandum* on the best method of measuring variations in the value of the monetary standard, Jevons's *Investigations*, Ricardo's pages on 'real value' and 'standard of value', C.M. Walsh's *Measurement of General Exchange Value*, Marshall's "Remedies for fluctuations of general prices", Foxwell, Nicholson, Sidgwick and Giffen. Questions in political economy for the 1905 Tripos are also listed.

The last paper to be traced, the one on index numbers dated 31.10.1905, is in IN/1. Moggridge (p. 96) writes that this paper was the first one and gives 31 October as the date of the supplementary answer that "was usual in cases where disagreements remain". As 18 October is unquestionably the date of three other papers, Moggridge may have considered the undated fragment on index numbers to be the first and the dated one (two supplementary pages included) to be the supplement. In discussing these papers it will be suggested that the order of composition was the reverse.

Cournot and Cassel are the only non English-speaking authors in these lists²⁴ and this gives support to Hayek's remark (1978, p. 284) that "[Keynes's] education in economics was somewhat narrow" because it was limited to books and articles

of the subjects on which Keynes wanted to specialise (MOGGRIDGE 1992, p. 95). However, HAYEK (1978, p. 285) singles it out as the first and most telling example of Keynes's faulty economic training: "I have reason to doubt whether he ever fully mastered the theory of international trade".

24. Pierson is the only addition from the list of 12 October (see above, note 16).

in English (except for Cournot). However it was no narrower than these linguistic constraints implied: besides Marshall's own contributions, Edgeworth's articles were carefully examined and Jevons's *Investigations* repeatedly quoted²⁵. American literature was the main source on trusts, railways, business methods and speculation. Overall, the reading lists were remarkably up-to-date, as demonstrated by an episode that took place seventeen years later, when Keynes signed the majority report of the Commission on the stabilisation of the German mark with two of the authors in these lists, Cassel and Jenks (Moggridge 1992, p. 380).

After this general description of Keynes's early economic studies, we can now go on to examine the fifteen surviving papers written in answer to the questions set by Marshall. For the readers' convenience, a complete list of these questions is given in the appendix. They are arranged by date and original progressive number (in brackets) and referred to in this way in the following sections. From the fact that no box is empty it can be inferred that few papers, if any, are missing.

3. "Professor Marshall's definition of social capital lacks precision"

The first interesting discussion is triggered by Keynes's paper on capital – 18.10.05 (3). The third edition of Marshall's *Principles*, which Keynes possessed and annotated, led him to react on lines similar to those adopted by Cannan: he was not prepared to follow Marshall's hybrid definition of 'social capital' as a middle term between the more precise and stricter concept of 'trade capital' and the broader, yet again more precise concept of 'accumulated wealth'. Keynes boldly asserts:

"Prof. Marshall's definition of social capital lacks precision ... It is not

25. Though the "simple, lucid, chiselled in stone" passage from Jevons's *Theory* was to be included in Keynes's centenary essay on Jevons (SKIDELSKY 1983, p. 165), it is possible that Keynes's enthusiastic judgment of Jevons as "one of the minds of the century" (Keynes to L. Strachey, 8 July 1905; quoted in SKIDELSKY 1983, p. 161) was prompted by his reading of the *Investigations in Currency and Finance*.

clear that there is much to be gained by separating 'social capital' from 'accumulated wealth of the community' unless it is wished to exclude from 'social capital' the free gifts of nature".

Marshall, however, failed to be impressed by the young wrangler's logical consistency and rejoined with a note of indulgence, possibly to hide a touch of annoyance:

"if you concluded that the term is not worth keeping, you would be at the point at which I have several times found myself. But whenever I return to the fundamental problem of the distribution of the National Dividend I find I *must* have a term for all sources of the National Dividend other than Land and Labour".

"You – Marshall insists – have made no provision for the only purpose – though that is of first rate importance – for which 'social capital' is needed".

When Keynes admits that his own definition of capital "approximates very nearly to trade capital", Marshall insists:

"that is to say you do not define social capital at all, but trade capital over again. In other words you give up the problem altogether, as I take it".

Then he goes on to criticize Keynes for omitting "the vital point":

"if production is used in its scientific sense a toasting fork in your room is capable of being included [and so we are back to] accumulated wealth"

but

"if omitted, must be omitted on the principle on which my definition is based, viz. the practical rule *De minimis non curat lex*"²⁶.

Unsatisfied with the paper, Marshall invited Keynes to write a supplementary answer, but this did not bring them

26. If Guillebaud's *variorum* edition of Marshall's *Principles* is right on this point, the expression was included in the chapter on income and capital only in 1907.

any closer on this issue. Keynes's first sentence is unpromising:

"I can see no resting place between regarding social capital as the aggregate of the whole wealth of the community, with the possible exclusion of land and personal capital, and whittling it down to something closely resembling trade capital".

Again in a condescending tone, Marshall gives a date when he found himself in a position similar to Keynes's, whose logic he finds unobjectionable:

"I formed this opinion in 1868, and have not swerved from it. I always act upon it in my own thoughts, and in esoteric discussions with mathematical students, such as Bowley, Sanger, Flux, Lawrence. But this has avowedly nothing to do with the question at issue. That question is: How is the traditional doctrine as to the national income being divided out between Land Labour and Capital – a doctrine which you find in the economic classics of every country, to be explained to non-academics. That is a matter not of logic, but of practical experience".

The comment hints at the inner circle where mathematical and logical analysis are the bread and butter of economic science, but also warns that experience counts for something.

Marshall concedes that his definition of 'social capital' is "arbitrary", but not "intolerably vague" – as Keynes writes – and recommends it as corresponding to "ordinary usage", "a fact that you persistently ignore", while he, as he puts it in a comment to the first part of Keynes's answer,

"wanted to get as near as [he] could to what the business man would say, not indeed at first blush, but after consideration".

In the abstract Keynes is right when he writes that there is no difference between houses and "furniture, clothes and books":

"I certainly regard my books much as my father regards his house (banning income tax considerations) as wealth held for my own purposes but convertible into cash if necessary".

Though this be true – "quis negavit?" is Marshall's com-

ment – it is also true that in ordinary language we make a distinction:

"that is the fact which you persistently ignore. Ordinary usage always counts houses in".

The practice by Income Tax Commissioners, legal courts and businessmen of including houses in social capital while excluding other personal property makes Marshall confident that his definition is adequate for practical purposes:

"my opinion is that, having been tested in all its details, and corrected by a long series of legal decisions, the results of which are technically expounded in many treatises, and are in their broad outlines known to everyone, it is less *vague* than almost any other definition in economic science"²⁷.

However, knowing his definition had no dignity in the realm of abstract science, Marshall had tried to introduce the term "usance of accumulated wealth" to form a matching pair with "interest of trade capital" and a useful tool for dealing with the National Dividend (Marshall 1961, vol. II, pp. 201-202). This would have answered his theoretical and practical needs alike, but the terminological innovation had been received with indifference:

"in my *Principles* I introduced many new terms. Critics abused me violently for it. Every one of them is now adopted more or less by English and American writers, with one exception. The term 'usance' which satisfies for me a more urgent want than almost any other, seems to meet no general want, and I have never seen it used. I then felt, as I have often felt before and since, inclined to discard the term 'social capital' and substitute 'accumulated wealth', supplemented by 'usance'. But my courage is still inadequate".

That courage he would never find, and probably was not even looking for, because in the third edition he had already

27. It is interesting to notice that, in order to stress Keynes's appreciation of common sense, COATES (1996, p. 91) quotes a passage from the *General Theory* (p. 59) in which Keynes defends his own definition of *net income* because it "comes very close to the practices of the Income Tax Commissioners". This is precisely the lesson taught by Marshall to his young and top confident pupil!

taken a diversive move, which was as far as his "courage" could go. As he explained to Cannan in 1898:

"you see the position taken up in my Ed. III comes to this, that I have openly adopted as my *standard* definition one which corresponds to what has been *de facto* my main use of the term ever since about 1869, when I used to think in Mathematics more easily than in English. I then adopted the doctrine of the National Dividend, its division into the shares of land, labour and capital ... That [capital] was throughout the stock of things, other than land, which are instrumental in satisfying human wants ... I did not openly define capital in that way; because I did not dare to set myself in opposition to English tradition. But in practice I nearly always used the term in that way, except when I was talking of trade-capital. Now I have dotted my i's and crossed my t's".

(Marshall 1961, vol. II, pp. 226-227)

This dotting and crossing was far from breaking with established linguistic traditions. "Distribution and exchange" reveals this conservative attitude, the need to "be as conservative as possible in our use of Capital from the social point of view" because,

"it [continuity of tradition] is nowhere more important than in our use of terms".

(*ibidem*, p. 231)

The real break never happened and Marshall adopted what he called "a little piece of conservatism" on the supposition that

"if one is in doubt whether the landscape would be improved by cutting down an old oak, the oak should be left yet a little while".

(*ibidem*, p. 232)

The notes in the margin of Keynes's paper reveal a similar concern. They confirm Dardi's opinion (1984, p. 219) that at this stage in the evolution of Marshall's thought "capital had changed from a scientific category to a linguistic use"²⁸. The inadequacy of Marshall's courage was soon to prove unquer-

28. Dardi's analysis of Marshall's conception of capital and his distance from the marginalists' gets confirmed by Marshall's annotations to Keynes who, at this early stage, appears to lean towards the more rigorous marginalist solution.

able and the break with common linguistic usage never did take place. Indeed by 1905 he was closer to dropping "usance" than to centering his analysis on it. In the fifth edition (1907) the term was relegated to a minor role and in the seventh (1916) it disappeared from the text (Marshall 1961, vol. II, p. 205). In the struggle between logical consistency and practical needs, the first had to be accommodated to the second rather than the other way round.

Marshall's complete understanding but hearty dislike of Keynes's logical obstinacy is proved by a later comment. In the paper on whether an increased use of machinery may lower wages - 23.11.05 (2) - Keynes writes:

"if the use of machinery increases more rapidly than accumulation of capital, less labour will be required per unit of production and there will be insufficient capital to increase the volume of production sufficiently to afford compensation. The demand for labour may, by this means, be temporarily diminished".

Marshall's reaction is that of a firm believer in the pedagogical value of "trial and error" who has been waiting patiently for such a slip by his pupil:

"with all your professions of logical purism in the use of 'capital', I find no clue to your use of it here. I can't help thinking you are using capital in the 1820 sense, when it meant labourers' necessities more than most things".

By then, however, Marshall's praise of Keynes was such that what a month earlier would have been considered a severe rebuke was no more than a passing comment and maybe even indirect evidence of Keynes's improvements.

4. "General purchasing power is incapable of mathematical definition"

Marshall's praise of Keynes's three papers of 18 October is limited to his final comment to (2): "a good answer". "A very good answer" is the comment to 31.10.05 (4), a detailed paper on Marshall's detailed questions about what was to be included in

the National Dividend to avoid double entries; but it is the paper on index numbers – 31.10.05 (5) – that first wins Marshall's enthusiastic approval:

"this is a very powerful answer. I trust your future career may be one in which you will not cease to be an economist. I should be glad if it could be that of [an] economist.

I shall be compelled in lecture to say a good many things on this subject which you know already".

A remarkable feature of this paper is Keynes's attention to problems of weighing commodities for devising index numbers of purchasing power. For comparisons of purchasing power, Keynes considers an arithmetical index to be preferable, indeed "the only possible" one and even "the most natural", a view he would correct in his 1909 Smith prize essay, where no index is seen as natural (Keynes 1909, Appendix B).

Keynes establishes a contrast between (a) the question of indexing purchasing power and (b) the question of calculating variations in the cost of producing gold. To deal with question (b) the price of any commodity can do, problems of weighing may be avoided and the use of a geometric mean may be defended because it is "easier to calculate" and "the results are independent of any particular year". Question (b) is

"essentially a question of probability; we must utilize all the usual methods for eliminating error. Our samples must be numerous and we must choose commodities which are as far as possible independent of one another".

In Keynes's view, problems arise because questions (a) and (b) are not always separated and (b) is in general the only one that statisticians have in mind. This applies, more or less consciously, to Edgeworth, Jevons and Bowley:

"much of Bowley's argument concerning the importance of weights and his general discussion of the elimination of error applies to (b) only. General purchasing power is incapable of mathematical definition; what we require for (a) is some representative scheme which will obtain general acceptance as consistent with common sense".

Marshall's agreement is expressed in his comment to the passage:

"I have always been an opponent of the tendency to be observed in most professional statisticians to rate the importancel of weighing low *in general*. I think they are all right themselves, but that they mislead the public".

Lack of the kind of 'logical purism' that Marshall still had reason to fear plays no minor role in his enthusiastic judgement of this paper. The subject was probably discussed on several occasions, given that both were deeply interested in it. Keynes's defence of the geometric mean and an unweighed index for dealing with question (b) and his admission that he saw "no reason for selecting commodities on a different principle" were met with Marshall's comment "I think I can show you one" and with his self-appointment as unique guide to the subject:

"I am a heretic, not at all a humble one, as regards the true faults of Arithmetic and Geometric Means; but don't know when I shall be able to deliver myself on this matter".

Keynes's supplementary two pages prove he was then convinced that weighing was always necessary.

The undated fragment on index numbers – probably lecture notes with Marshall's comments – deals with problems that seem to have been the subject of further discussion, after Marshall's encouragement on 31 October when he wrote:

"I have a very long chapter in manuscript on the subject of the measurement of general purchasing power".

It can be guessed that the 'long chapter' was a first version of what was later to be remoulded into chapters II and III and Appendix B of *Money, Credit and Commerce*. Keynes may have had access to it as the undated fragment refers to the 'sawdust story' that Marshall considered an instance of the failure of geometrical indexes if the price of a commodity happens to be zero and later inserted in Appendix B (Marshall 1923, p. 279, n. 2). But Keynes could as well have learnt the story in the lecture-room.

However Keynes was still unconvinced. One sees the persistence of differences of opinion as to the viability of a geometrical mean for constructing indexes other than of purchasing

power. Both zero price (like sawdust made available to toy-makers as soon as a saw-mill is implanted in their village) and infinite price (for which the text introduces the example of yellow Chartreuse, after the receipt of it has been lost) are extreme instances in which any method of probabilities is useless:

“in any case a method of probabilities can be rendered useless by extreme instances. But, as I say, with an instance of zero price and one of infinite price (or as I should prefer to say, an almost negligible price and a prohibitively high one) the G[eometrical] M[ean] is mistaken; but the A[rithmetical] M[ean] is discredited after the same method as you discredited the G. M.”

Marshall now has to plead guilty, although he records agreement on the main points:

“I had not overlooked this difficulty. But in practice it is not a grievous one. In the hurried remarks which I made, I did not apparently make my meaning clear. The matter is far too long for writing. In substance it is this. The faults patent in A.M. are due to difficulties of weighing. The defenders of G.M. seem to think that there are no such faults in G.M. I came to the conclusion that there are and invented the Sawdust story to bring out my point. I agree entirely with the passage you have underlined [i.e., the passage in italics]”²⁹.

The paper and the fragment on index numbers are noteworthy because their central tenet – the idea that weighing is essential and to a certain extent arbitrary, as “general purchasing power is incapable of mathematical definition” – was to be developed by Keynes in his 1909 essay where, moreover, Marshall’s 1887 *Contemporary Review* article is approvingly quoted and utilized³⁰. This establishes a Marshallian link with one of the subjects that early came together to start Keynes’s interest in probability theory. Discussion of index numbers in

29. Their discussions on the subject seem to have continued, given Marshall’s final proposal: “perhaps we can have a talk about G. M. after next Saturday lecture not before, for part of what I have to say will needs find place between 12 and 1”.

30. Keynes’s approval refers in particular to Marshall’s ‘chain’ method of compiling index numbers (KEYNES 1909, pp. 79, 100, 122 ff.). In the obituary, Keynes lists this method as one of Marshall’s major original contributions to monetary theory (*Memorials*, p. 31).

chapter XIV of the 1907 fellowship dissertation still has references to passages from Bowley’s book that Keynes had discussed with Marshall.

5. “A much improved sense of the true relation of economic figures to reality”

In November Marshall set papers on sophisticated problems of applied economics and empirical research. The paper on the tendency of individual businesses to increase in size and on counteracting forces – 9.11.05 (2) – is typically Marshallian as regards both question and answer. It can be taken as an instance of the sophisticated level of these discussions. Keynes’s answer gives a well-balanced account of internal and external economies and Marshall’s corrections are really minor, generally aimed at showing the limitations of internal economies, though Keynes himself is very cautious in assessing the advantages of big businesses. Among the equilibrating forces, Keynes highlights the industrial districts,

“the localisation of industries in certain centres where the advantage of centralization can be obtained although production is still distributed amongst a number of independent firms”.

Marshall’s comment is a simple “Yes”, repeated when Keynes goes on to examine the question in a more formal way:

“to treat the question more analytically, the apparent instability in supply in cases of increasing returns, by which it would appear theoretically that any firm which obtains a start must ultimately absorb the whole business, can be partially explained away without reference to economic friction or to the influence of time. For the economies of production on a large scale may depend more on the *total* volume than on the method of distribution between the various sources of supply: i.e.:

if y is the total production, y_r the production of the r (th) source of supply; p_r = the marginal price in the r (th) source we may have

$$p_r = Q(y) + f_r(y_r)$$

$Q(y) + f_r(y_r)$ may always obey increasing returns,

but $f_r(y_r)$ diminishing returns after a certain point is reached.

Thus so far as each individual industry is concerned, there is dimin-

ishing returns. The kind of considerations indicated above increase the importance of $Q(y)$, i.e. the part of the price dependent on total and not individual output”.

After a second “Yes”, Marshall explicitly associates the two terms – $Q(y)$ and $f_r(y_r)$ – respectively with external and internal economies. Almost as usual, Marshall refers to a text, “already in print” where the subject is thoroughly examined:

“in a full discussion (which I have already in print!) it is necessary to dwell on the two modern sets of tendencies one tending to increase $Q(y)$ relatively to $f_r(y_r)$, the other tending in the opposite direction”.

The paper ends with a note of confidence in the future of small businesses:

“in proportion as $Q(y)$ [representing external economies] asserts itself in the future, small producers will be enabled to hold their own: and it certainly appears that industrial progress in the future may consist of improvements which, while very rapidly diminishing the total cost of production as the volume of production increases, will not assist large individual producers against small producers to anything like the same extent”.

Marshall comments:

“a good answer.

Perhaps the most important points you have omitted are:

in group n. 1 [causes that tend to increase the size of individual businesses], the importance of supplies of coal, minerals or other raw material or implements, which tends to help very big firms in some industries, especially iron and steel[;]

per contra organized produce markets, which help medium firms in cotton and other industries.

But the whole subject is too large for short treatment.

A good answer”.

The paper on comparison of railway services of different countries – 9.11.05 (3) – came after much specialized reading, as we have seen. Its perfect organization and detailed treatment are amazing for a school-room exercise. Keynes starts by stating that

“the matter will be argued under several different heads, and there is

no method of making these different considerations altogether *commensurable*. There is no practical rule for adding and subtracting advantages and disadvantages of different kinds. When we have as many considerations before us as is possible, the best we can do is to summarize them in some general statement based rather on common sense than on any scientific principle”³¹.

A large red-ink “Yes” is not altogether unexpected.

Then Keynes arranges his answer under two distinct sections, freight and passenger services, and maintains that “any weighing of the two against one another is almost impossible”. He concludes, therefore, that

“if, as it is probable, the passenger service of Prussia is superior to that of USA and the freight service inferior, it is difficult to see on what principles we are to decide as to which country has the superior service on the whole”.

This statement goes beyond the mark set by previous reference to common sense and Marshall intervenes to curb such excessive scepticism:

“you ought to have added: but two (rather vague) principles can be laid down, as to which the important thing to be noted is that each has its own sphere of application; and often the two spheres are not distinguished, but bits of the two principles are applied indiscriminately in either sphere”.

After 5 pages of writing, when the discussion of criteria of comparison of freight services is nearly over, Marshall thinks the paper is over and comments:

“The answer is good and it shows in particular a much improved sense of the true relation of economic figures to reality; but it is rather of the nature of a fragment”.

Then he realizes that the paper continues – “Oh I see it is not finished!” – with Keynes’s list of criteria of comparison for passenger services. Details about fare discrimination policies, re-

31. Resort to common sense to support abstract science when dealing with practical issues was always endorsed by Marshall. For various references, see RAFFAELLI (1995, pp. 4-5).

turn tickets and workers' trains are considered. Austrian, German, Prussian (corrected by Marshall to "Westphalian and Rhineland"), Indian, American (Marshall states that "there is nothing better in the world than some U.S. lines now"), English and French practices and the need for better statistics are discussed. The tone of Marshall's comments is relaxed. His summer travel to Stern-La Villa, with over 400 kilograms of books, is introduced by Marshall to show that, if one "knows the ropes", travel on the Continent with heavy luggage can still be cheap, contrary to Keynes's opinion (possibly due to his Swiss experience that very summer). When Keynes lists "the courtesy of officials" among the factors that influence valuation of passenger services, Marshall makes fun of such scrupulousness:

"you remind me of a medical practitioner who had a large smile, and put it in the bill".

The final judgement is that the paper is "a brilliant answer" whose only serious fault has been pointed out in the comment on Keynes's statement of the impossibility of an overall comparison.

The short paper on the price policies of a monopolist and a producer in a competitive market – 9.11.05 (4) – is of even greater interest. Keynes states that a monopolist producer of joint services should set his price for each separate service at the cost of producing an *additional* unit of it:

"this is the principle of charging what the market will bear; the amount of the fixed charges defrayed by the scale of each service is determined solely by the demand for that service. After the plant is set up the monopolist ought, in any case, to adopt this method for his prices. He will only have entered the business wisely, if there is a prospect that the services provided taken as a whole will defray the fixed charges. If the above method will not yield him a profit, no method will".

Marshall's approval is deep, but qualified:

"this is an *admirably* clear statement of the pure monopolist policy in the abstract";

but it is true of the "abstract" monopolist only.

"the question – he goes on – rather points to the non-existence in real life of such a person, at least in any considerable affairs".

A similar comment is made when Keynes, considering the case of a competitor entering the field, asserts:

"There is no method by which competition can automatically decide what proportion of the total cost of production each service *ought* to bear".

Marshall warns him that

"'automatic' competition belongs to the mathematical world on the other side of the looking glass".

These criticisms, however, are different from the kind of misunderstanding shown by the early paper on capital. They are more explicit because Marshall appears to rely on Keynes's own judgement and probably thinks the apprenticeship is almost over. The final comment bears out Marshall's opinion on Keynes's decisive improvements:

"This is an admirable paper. It is one of the most interesting I have ever seen. It still has traces of the old tendency to talk of things in the real world as they may be in a conceivable world. Your propositions are often too unconditional and if you were to apply them in practice, you would come to grief. But you are straining yourself to take account of realities; and comparatively seldom lash into 'the world behind the looking glass'. I repeat what I said before, that I would like to see you become a member of some economic staff, and especially of this. But I know the world is large".

The last three papers do not add very much to the picture but their content is interesting in itself. In the paper on the causes that govern variations in the amount of employment – 23.11.05 (1) – Keynes hints that speculation might be one of them. Among other causes, employment depends on

"the extent of the prevalence of a speculative [Marshall adds: 'in the dyslogistic sense'] or gambling spirit, or of an oversanguine outlook exaggerating the booms and, in consequence the subsequent depressions also".

Marshall's comment aims at distinguishing "speculation"

from “gambling”. The “gambling spirit” does not play any positive role and Marshall’s negative attitude to it is constant³². By contrast, “speculation” can be constructive, as Marshall (1919, pp. 250-68) was to explain and as confirmed by his approving “Yes” about Keynes’s opinion, taken from Emery’s book, that

“the separation of the functions of manufacture and of speculation, which the development of produce exchanges has brought about, tends towards increased stability”.

Emery’s *Speculation on the Produce and Stock Exchange of the U.S.* was also read and annotated by Marshall, who pointed out in a note the negative effects of speculation when the public knows what the professionals want them to know³³. But there is no evidence that some of Marshall’s less orthodox opinions on speculation were discussed with Keynes. The way to the Casino simile of the *General Theory* still looks rather long³⁴.

Another comment by Marshall is prompted by Keynes’s assertion that

“in so far as it [increased use of machinery] means expensive permanent plants, it may prolong and intensify the evils of overproduction and lack of foresight. It hinders the mobility of capital”.

“There is truth implicit in this; – Marshall admits – but I should hardly like to assent to it as it stands. The position is too complex for three lines”.

The last paper on price discrimination in railway services – 23.11.05 (3) – is discussed by Keynes with the help of mathematical equations to reach the conclusion that the demand for a service may be raised or lowered by discriminating price policies. Marshall’s aim is to keep Keynes’s mathematics at bay:

32. Cf., for instances of this attitude, Marshall’s speech at the Industrial Remuneration Conference in 1885 and his letter of 17 November 1919 to *The Times* (GROENEWEGEN 1995a, pp. 589 and 646).

33. Marshall’s comments to Emery as part of the former’s views on ‘malignant’ speculation are discussed in DARDI & GALLEGATI (1992).

34. For an assessment of business cycles views by Cambridge economists, see GROENEWEGEN (1996).

“no doubt this conclusion emerged from the mathematics. But I am certain it ought to; and as the statement of the problem seems right, I conclude that the mathematical machine, if set in work, would do its duty.

Again an excellent paper”.

Excessive use of mathematics was a controversial issue also in Keynes’s undated paper on Smith’s sentence about a tax on coinage. Marshall rebukes Keynes’s use of unexplained mathematical symbols:

“Jotted notes with mathematical symbols unexplained are rather vexatious; and examiners are human beings ...

I do not know what your symbols are. But I think you do not want any”.

The confidential tone of the rebuke is different from the controlled tone of earlier comments, when the master was still on his own³⁵.

6. Conclusions

Discussion of the papers and consideration of Keynes’s notes show that his early economic apprenticeship was far from anonymous. Coming into Marshall’s laboratory from the Mathematical Tripos, he had to learn the lessons of practical experience, realism and common sense. This set his teacher an arduous task, but Marshall was equal to it and performed it to his own satisfaction.

To those who know Marshall, the questions he asked and the way he dealt with Keynes’s answers should not come as a surprise. Marshall’s methodological remarks and his comments on capital, index numbers, business size, speculation and other issues confirm what is generally known of his ideas and improve our knowledge of his scientific strategies. The most interesting parts of this teaching experience probably lie in its human aspects and his warm approval of the improvements of such an

35. Notwithstanding his criticisms, Marshall finds the first part of the paper “very good”.

original student. The trenchant and brusque Professor known to us from altercations with Henry George and Sidney Webb and episodes of his relations with Sidgwick, Foxwell and Keynes's father, all well documented in chapter 13 of Groenewegen's biography, reveals in this circumstance a caring attention to avoid criticisms that could jeopardize Keynes's interest in economics. This is one of the most hidden features of Marshall's character, helpful to account for the marvellous harvest of the Cambridge school.

Many of Keynes's friends and scholars of the past, from the Cambridge Circus onwards, might have taken this episode for granted. It still fitted their own experience and oral tradition. Nowadays, it may be useful as a reminder that Marshall's teaching implied more than the transference of economic techniques. Teaching was not confined to showing the tools in the box: knowledge of their limited uses and proper range of action was even more important. This implied a definite perspective on the social world and on the organization of knowledge. It is no surprise that the Cambridge school originating from such a springboard held views on economics quite different from the value-centered theories of other schools (Becattini 1990), a fact that Keynes's future career was to prove beyond doubt. As it has become quite fashionable to maintain that Keynes's contributions to economics derived from his philosophy, a field where Marshall is supposed to play no role, this paper should lead us to consider that even Marshall held deep philosophical and epistemological views and these were required in 1905 to keep Keynes on the right side of the looking glass. At that time, the latter was the reticent follower of Marshall's lead in setting limits to the use of mathematics and paying attention to ordinary language³⁶.

The economics that Keynes learnt was not thorough, but neither it was 'standard'. The first part of this statement suggests that Shove and Hayek were probably right; the second points to the fact that this did not happen by chance: the student who spent hours on railways fare discrimination

36. On the Marshall-Keynes relation cf. also GROENEWEGEN (1993 and 1995b).

policies could have found more time for abstract theorising, if his master had set different priorities.

After this first experience, Keynes's decision to join Marshall's economic staff in 1909 could hardly be called amateurish and Hayek (1978, p. 287) is probably unfair when he says that Keynes was

"rather impatient of the slow, painstaking intellectual work by which knowledge is normally advanced".

Simply, his was a *different* kind of "painstaking intellectual work".

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Appendix

List of the questions asked by Marshall, arranged by date and progressive number (in brackets):

The number of pages refers to the length of Keynes’s answers; 31.10.05 (3) and 9.11.05 (5) have no answer.

The paper on money is undated; being the only one with number six, it could have been written either on 31 October or on 9 November, when five papers were listed.

18.10.05 (1) (4 pages). How far has Malthus’s doctrine been supported by the history of migration since his time?

Consider in particular the broad fact that migration in Europe is chiefly from the more sparsely peopled districts to those in which population is dense and the exceptions to that rule.

18.10.05 (2) (3 pages). What is the nature and what are the limitations of the assistance which estimates of Consumers' Surpluses can afford in making a second approximation to a comparison of the relative material prosperity of countries in widely different economic circumstances.

18.10.05 (3) (7 pages + 3 pages of a supplementary answer). Give your own definition or definitions of Capital: and say whether you consider as capital (a) a private house, (i) owned by the occupant, (ii) owned by a professional house-owner, (b) a lodging house, (c) a hotel, (d) an excursion steamer, (e) a piano in a private house where (i) it is owned or (ii) hired by the month, (f) a piano owned by a teacher of music, (g) a piano for sale in a shop.

Comment briefly on the definitions of capital which say that it consists of

- (i) products designed to be used in further production
- (ii) products used as aids to further production.

31.10.05 (1) (1 page). If only those things which owe nothing to labour are classed as land, and if there is no material thing in settled countries of which this can be said, it follows that everything must be classed as capital!

Does it follow?

31.10.05 (2) (2 pages). The cost of houseroom after deducting the value of land has increased and is increased relatively to things in general in every western country: what are the causes of the change.

31.10.05 (3) (No answer). What have been the chief causes tending to raise or lower the prices of (a) meat (b) coal in England during the latter part of the 19th century?

31.10.05. (4) (1 page). In estimating that aggregate of the country's output which constitutes the greater part of the national dividend, how would you trim down the following, in order to avoid double entries?

Sheep, cattle, horses.

Milk, butter, oats, hay, mangold wurzel.

Cotton, yarn, calico, cloth, clothes, coal, iron, steel, textile machinery.

Services of tailors, railwaymen, medical men, retailers, cooks.

Decide whether to take wholesale or retail prices.

Let us assume wholesale where they differ i.e. take the price paid by the retailer and count his services extra.

Include all finished goods: all increase in the whole stock of goods of every kind: all exported goods and all shipping services which lead to increased imports or no exported goods and all net imports save such as due to bringing home a capital on the balance.

With these exceptions include nothing that will enter into the price of any future finished produce e.g. *not* fodder for live stock, not live stock themselves except horses to be sold off the farm (out of agriculture), if sold to jobbing masters, yes or no according as you propose to include the *net* earnings or *gross* earnings of those people.

31.10.05 (5) (6 pages + 2 of a supplementary answer). What considerations are of most practical importance in selecting commodities for use in an arithmetical index number to represent general purchasing power?

Are there any pair of commodities mentioned in the last question which you regard as suitable for this purpose, though mutually exclusive for the purpose of the last question?

Would your answer to the first part of the question be different if the index number were geometrical?

Fragment on index numbers (1 page). It is doubtful whether it is a supplementary paper or simply a comment on Marshall's lectures. It deals with averages, geometrical and arithmetical index numbers and was probably written after the previous paper.

9.11.05 (1) (1 page). In estimating national prosperity, why are income statistics a better guide than those of wealth?

9.11.05 (2) (4 pages). Enumerate briefly the chief causes which are increasing the size of individual businesses at the present time.

And describe changes which are assisting small firms in competition with larger.

9.11.05 (3) (11 pages). Supposing it to be asserted that the railway service of one country is better than another, what facts would you require to enable you to test the statement. Arrange your answer under the heads:

- (i) charges
- (ii) rapidity of service
- (iii) other advantages offered to the customer
- (iv) physical configuration of the country
- (v) density of population

9.11.05 (4) (2 pages). In what sense is it true and in what false that a monopolist adjusts his price to "what the market will bear"? And that the producer in a competitive market must keep close to cost of production?

9.11.05 (5) (No answer). Is it a sound proposal to determine agricultural rent by a sliding scale according to the prices of produce?

23.11.05 (1) (3 pages). What causes govern variations in the amount of

employment in a country from decade to decade, assuming the conditions of foreign trade to remain nearly unchanged?

23.11.05 (2) (2 pages). Under what conditions is it possible that an increased use of machinery may lower wages? Do such conditions exist today?

23.11.05 (3) (3 pages). How is the output of a monopolistic industry likely to be affected if, having hitherto been allowed to discriminate between its customers, it is prevented by law from doing this?

What light does your answer throw on the problem of governmental interference with the rates charged by railway companies?

No date (6) (4 pages). Adam Smith says (W.N. iv.6) "When a tax on coinage is so moderate as not to encourage false coining, though everybody advances the tax nobody finally pays it, because everybody gets it back in the advanced value of the coins": Examine this.

Consider the incidence of taxes on gold mines levied

(a) universally – on all mines³⁷

(b) only on mines not yet operated – i.e. not retrospective.

And consider how the answers are modified if the tax affects only one country.

37. Up to this point, Keynes put the same question to his students in the Lent term of 1912 (*Collected Writings*, vol. XII, p. 723).

October 18.05

1) How far has Malthus's doctrine been supported by the history of migration since his time? Consider in particular the broad fact that migration in Europe is chiefly from the more sparsely peopled districts to those in which population is dense and the exceptions to that rule.

See Levasseur iii
The German Dictionary
Palgrave
Weber Growth of Cities¹

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Malthus is careful to lay very little emphasis on emigration as a remedy for the dangers of overpopulation. He regards it as "a partial and temporary expedient" and necessarily "a resource of short contrivance". His historical investigations are used to support two main contentions: (i) the initial² incentive to emigration has not in general been the pressure of population³ but religious, political and other causes. (ii) The emigrating class is not usually that which feels first or most painfully the evils of redundancy.⁴

The difficulties and dangers to be overcome by early emigrants are, he shows, so great that only the comparatively enterprising will undertake them, and the friction acting against departure from the home country [is] so powerful that the special stimulus of religious or political difficulties is often essential.

Further the pressure of population on the food supply has often been greater in the early history of a colony than in the mother country itself.

The chief modifications which the history of the last hundred years has necessitated in Malthus's conclusions are due to the vastly increased facilities of conveyance and transit and the rapid economic progress of new countries. Malthus's conclusions depend on the effective action of friction, and this action has steadily diminished. The necessary enterprise of the emigrant is therefore less, and a lower stratum than before is tapped by the outflowing stream.

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It has been possible, therefore, for the people of Italy and Eastern Europe to replace the lessened outflow from Western Europe and particularly from England.

Yet it can hardly be maintained that pressure of population is the prime explanation of recent emigration, for it is Western Europe and Great Britain which are the more densely

¹ [Levasseur E., *La population française*, 3 vols. Paris, Saint-Brieuc 1889-92; Weber, A.F. *The Growth of Cities in Nineteenth Century America*, Ithaca NY, Cornell University Press 1899; *Palgrave's Dictionary of Political Economy*, ed. by R.H.I. Palgrave, London, Macmillan 1894; and an unspecified *German Dictionary*.]

² [Initial replaces 'direct'.]

³ I did not recollect that he put this point so strongly and on referring to his chapter on migration I find my impressions rather supported as it seems to me (vol. 2, p. [illegible number]).

⁴ [Referred to the whole paragraph] True: but I. not relevant. No I see it is relevant to the question as you have taken it. But I did not intend to lay stress on Malthus's special views as to migration.

and Eastern Europe the more sparsely populated. Part of the phenomena are to be explained, as in Malthus's time, by political and religious events; the emigration of Poles, of Jews and of various Russian sects is doubtless due to such causes. But the greater⁵ bulk must be, *prima facie*, traced to a greater relative poverty in those countries from which emigration has largely increased. Emigration is not from countries which have been encouraged by increasing prosperity into excessive fecundity,⁶ but from those whom apathy of governmental management has allowed to lay behind in the general economic advance; their emigration is rather due⁷ to the more rapid progress of the new world than to the necessities of an increasing population.⁸

For the advance in facilities for conveyance and transport profoundly affects the pressure of population on food; regarded from the point of view of distribution. What is relevant today in any given country is not the relation between population and the food producing powers of that country, but that between the population and the country's purchasing power in the world market for food.⁹

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The relation between the food supply that is available for purchase and the population of the western world may be crucial. But the particular geographical distribution of this population need have no correspondence to the food producing powers of particular areas.

Distress in a country is therefore more likely to be due to government mismanagement, to economic backwardness, or to defective economic organisation, than to any iron law in the nature of things between the population and the supply of food in given districts.¹⁰

We ought to expect emigration from the economically backward, rather than from the densely populated countries of Europe; and statistics bear out the expectation.

The increasing approximation to a world market for food supply, and the decreasing friction against movement on the part of unenterprising or unintelligent persons have brought about this modification of the phenomena observed by Malthus.¹¹

Turning from emigration from a country as a whole to the emigration of population within a country itself, the trend of the population from the country to the towns is nothing new - though it has, no doubt, become more marked. So far as births go, London has been more self-supporting in the hundred years since Malthus than in the century which preceded him. But although somewhat improved conditions in city industry have brought about this result,¹² the vast increase of large towns must be largely traced to migrations

⁵ ["Greater" is underlined by Marshall] yes. The great majority of the Slaves and Italians who go to America are not escaping from persecution.

⁶ The birth rate is generally low in rich districts and this tendency is increasing on the whole, though irregularly.

⁷ Largely to the fact that they take to America a kind of labour which is in relatively (not absolutely) high demand there.

⁸ (A)

⁹ On the right track; but not the right words.

¹⁰ See (A) on page 2.

¹¹ Yes. But Malthus was hardly dead before the vast emigration from Ireland set in.

¹² They do not increase births: they diminish deaths and especially of infants.

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from the Country districts.¹³ The cause of this has plainly no relation whatever to Malthus's favourite doctrines and is due to the increased centralization of industry and to the higher wages and greater excitement which are offered to the successful by the conditions of town life.

The central point is this: - Malthusianism can no longer be applied in general to different countries regarded as units, isolated for the most part as regards their food supply. In the Western world at any rate a much larger unit than any one country must be regarded; and the distribution of population within this larger unit will be determined by causes other than the food producing powers of particular districts.¹⁴

¹³ Until quite recently.

¹⁴ My version is this

(i) Malthus' doctrines are opposed to "Malthusianism"

(ii) Malthus was almost wholly right with regard to those causes which he discussed. But it was not his business to consider all the causes that bear on questions such as that under discussion: and he would not have discussed those which are of most importance now, because generally speaking, they did not exist in his time.

18.10.05 2. What is the nature and what are the limitations of the assistance which estimates of Consumers' Surpluses can afford in making a second approximation to a comparison of the relative material prosperity of countries in widely different economic circumstances.

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Regarded as a practical problem the applications of the principle of Consumer's Surplus as a second approximation in such a case as this is so remote, that there is little else to be done than to point out its plain limitations.¹⁵

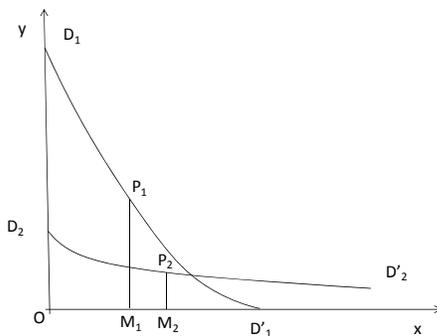
The first approximation will be presumably made by a comparison of the actual volume of consumption of material goods and services¹⁶ per head of population, allowance being made for any differences in the sacrifices that may be made to obtain given utilities in the two countries.

But although this takes into account the amount of consumption and the marginal utilities of the last amounts consumed, it gives no indication of the total utility obtained. In comparing two¹⁷ collections of persons between whose circumstances there is no wide or marked distinction, it may in general be safely assumed that, if other things are equal, the differences in total utility will be of the second order of small quantities.

But if the circumstances are widely different, there is insufficient ground for such assumptions or for supposing that their demand curves for a given commodity are of even approximately corresponding shapes.

Although A may consume less than B and at a greater sacrifice, A's surplus satisfaction may nevertheless be greater than B's. No account could be taken of such a phenomenon in the first approximation, or without estimating the consumers' surplus in the two cases.

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D_1D_1' D_2D_2' the demand curves for consumers in two countries.

If P_1M_1 is the price (not money) in the first (see iii below) P_2M_2 is the price in the second

The consumption in country 2 is greater and at a less sacrifice than in country 1: but the consumers' surplus is nevertheless much greater in 1.

The limitations to the practical applications of this method are:

(i) We require a knowledge¹⁸ of the whole of the two demand curves. In the more

¹⁵ Yes.

¹⁶ In excess of necessities.

¹⁷ Large.

¹⁸ ["Knowledge" is crossed out by Marshall] An estimate by a sort of interpolation.

practical applications of consumers' surplus it is usually sufficient to know the shape in the neighborhood of the point of equilibrium - for we are only concerned with the difference in the surplus which would be caused by a slight shifting of the point of equilibrium.

(ii) There is usual difficulty - that we require for completeness in an integral comparison of this kind a combined demand curve for commodities satisfying the same¹⁹ want or whose services are complementary.²⁰

(iii) We require to compare sacrifices: it is difficult to obtain a common measure. If in the above diagram P_1M_1 P_2M_2 ²¹ represent money prices in the two countries, irrelevant and confusing monetary problems would be introduced.²² What the above diagram is intended to represent is this - that although greater disutility is undergone in one country for a less volume of commodity than in the other,

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the actual satisfaction obtained from that particular commodity is greater.

The marginal disutility of labour in the two countries may not be the same.^{23 24}

¹⁹ Ultimate.

²⁰ Yes, and a neglect of intermediate utilities.

²¹ Must.

²² [From "irrelevant" onwards, the sentence is crossed out by Marshall] And therefore the first step is to estimate the real utility of money units to people in about the same circumstances in different countries: a thing not utterly impracticable in many cases.

²³ Climate must certainly be reckoned for. As to differences of temperament, when they are deep and broad there is little to be done about them now: though perhaps physico-psychology may enable something to be done several hundred years hence, possibly even earlier.

²⁴ A good answer.

18.10.05. 3 Give your own definition or definitions of Capital: and say whether you consider as capital (a) a private house, (i) owned by the occupant, (ii) owned by a professional house-owner (b) a lodging house (c) a hotel (d) an excursion steamer (e) a piano in a private house where (i) it is owned or (ii) hired by the month (f) a piano owned by a teacher of music (g) a piano for sale in a shop.

Comment briefly on the definitions of capital which say that it consists of (i) products designed to be used in further production
(ii) products used as aids to further production.

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The investigations of economists have certainly shown that the term "Capital" in common usage does not correspond to any unique notion, which must for the purposes of science be rendered precise, but in whose scientific definition there is no place for anything arbitrary. No amount of analysis can bring out any exact or precise notion which any one using the term in common parlance must always have at the back of his head: - unless indeed we so generalise and stultify the expression as to include all accumulated wealth whatever.

By capital accumulated²⁵ wealth in some form or other is always intended, but the form varies not only according to the predilections of particular writers but necessarily - unless new technical terms are introduced - according to the particular subject under discussion. If, therefore, we are to be precise, it is not sufficient to analyse and clarify popular usage; an arbitrary element must be introduced, - which should be dependent upon scientific convenience. In such a case as this we ought to draw the line between what part of accumulated wealth is and is not capital at a point where the distinction is important - with this proviso, that common usage must not be flagrantly violated.

If, as in this case, there is more than one point at which an important distinction can be drawn, we must either invent new technical terms or be content to use the one term on the understanding that its precise meaning varies with the context.

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Before selecting what seems to be the most appropriate line of division, it will be well to indicate those lines which possess the greatest prima facie importance.

(i) α . Accumulated wealth which will render up its intended utilities by the addition of the time element only; the commodity is complete but it cannot be or is not wholly consumed except after an interval of time. By 'intended utility' is meant the direct service rendered; whether these direct services themselves produce utilities is not taken into account.

β . Accumulated wealth which requires the assistance of labour or natural agencies as well as time in order to render up its intended utilities.

E.g. Houses, food, pianos for private equipment, clothes belong to (α). Machines, pianos for the use of public performers, living animals²⁶ belong to (β). A man of war in

²⁵ ["Accumulated" is underlined by Marshall] Except that from the business point of view land, at all events when used for business purposes[,] is called capital.

²⁶ ["Houses" and "Living animals" are underlined by Marshall] Carriage horses? Houses need to be

- commission belongs to β ; as a poor hospital to α . It is improbable that the distinction is precise. Some complex objects, which render more than one kind of utility, may belong partly to α and partly to β .
- (ii) α . Accumulated wealth the consumption of whose utilities is intended for immediate enjoyment.
- β . Accumulated wealth whose utilities are to be used for further production.
e.g. food intended for luxurious use, the accessories of taste and of the enjoyment of leisure generally, 'comforts' belong to α ,
food or fuel necessary for the efficiency of dead or living agents of production to β .
- (iii) α . Accumulated wealth whose direct utilities are to be consumed by some person other than the owner. β . whose utilities are to be entirely consumed by the owner.
 γ . whose direct utilities are consumed by the owner, but whose ultimate utilities are consumed by some other person.

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It is plain that by combinations of these three methods of division, a large number of possible definitions of capital could be derived.

Trade capital is (iii) α + (ii) α . e.g. pianos for hire
together with (iii) γ + (ii) β e.g. factory buildings

Many definitions - including those of Ricardo, J. S. Mill, Böhm-Baverk - closely approximate to (ii) β .

Prof. Marshall's definition of social capital lacks precision, as we are referred back for its interpretation to the meaning of income, which is regarded as sufficiently defined by common usage. But that it is so sufficiently defined is rendered doubtful by the extreme difficulty of saying what the common usage of the term precisely is.

Excluding personal capital, in common usage income is certainly yielded by all trade capital; the income tax commissioners - mainly, it is to be supposed, because (i) the sums involved are large, (ii) the inclusion is fairly free from practical difficulties and dangers of evasion - include land and houses alone of articles falling under (iii) β .

It is not clear that there is much to be gained by separating "social capital" from "accumulated wealth of the community" - unless it is wished to exclude from "social capital" the free

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gifts of nature.²⁷

tended.

²⁷ I think that is true; and that the term social capital is never used except when this is important. If you concluded that the term is not worth keeping, you would be at the point at which I have several times found myself. But whenever I return to the fundamental problem of the distribution of the National Dividend I find I must have a term for all sources of the National Dividend other than Land and Labour. For some years I tried experimentally to induce people to regard the usance of clothes etc. as a source of National Dividend as Jevons does, and Irving Fisher also, I think. But I found that even those who were academically inclined revolted at this use (De minimis non curat lex. The details were too trivial. They were worse than export statistics of £ 87.503.214, followed by 4p.6d3/4.) While they concurred in the

There would certainly be a lack of economy in terms if the expression "capital" were absorbed for this purpose.

But on the other hand it is difficult arbitrarily to assign to one part of accumulated wealth a term which could, without violent breach of usage, be employed for almost any part whatever.

The definition I propose to give approximates very nearly to trade capital

By "capital" is to be understood: firstly that part of accumulated wealth whose utilities, when by the agency of time or other factors they come to fruition, are intended not for immediate consumption but as agents of further production: and secondly that part whose utilities are intended for immediate consumption but not by the owner of the wealth in question.²⁸

I can see no reasons - save those which actuate the income tax commissioners - for attempting to frame a definition which would include houses owned for residential purposes by the occupant and not his other personal effects. It could only be managed by explicitly and by name including houses and excluding other personal effects.²⁹

In the definition given above logical classification would have gained by omitting the second clause, but greater harshness would have ensued as regards usage. All violations of usage would be avoided by adding a third clause - "thirdly all real estate, including lands and houses, by whomever held and for whatever purpose".

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One further explanation of the definition is necessary. Clause 1 is in no circumstances intended to cover wealth intended for either the luxury-consumption or the efficiency-consumption of human beings - although in a sense the latter may be regarded as devoted to future production.

But by clause 2 such wealth is included in the cases where it is owned by some person other than the consumer.³⁰

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With regard to the effect of the foregoing definition on particular instances

(a) private house (i) owned by the occupant is included or not according as the third clause is added or not

(ii) owned by a professional house owner is included by virtue of the second clause

advisability of regarding as income those "usances" which are as a rule expressed in money form.

²⁸ You say "agents of further production", but I think you mean agents for further productive use in business. For the kitchen stove in a private house would also be included, and I think you intend to include only those stoves that are used in hotels, and perhaps those in stove factories and shops.

²⁹ In practice a business man always treats his own house as potential capital. He deposits its title deeds as security with his banker without any hesitation. But borrowing on furniture and still more on clothes is not common, and indeed scarcely reputable. This consideration weighed a good deal with me. I wanted to get as near as I could to what the business man would say, not indeed at first blush, but after consideration. His first answer would generally overlook some difficulties. When he came to consider these, and had brought before him the great economic advantage of excluding land, it seemed to me that he came to that use which - chiefly for that reason - I ultimately adopted.

³⁰ That is to say: you do not define social capital at all, but trade capital over again.
In other words you give up the problem altogether, as I take it.

(b) a lodging house is included - perhaps partly by the first clause, and certainly by the second. If the third clause is not added, a deduction must be made in so far as the lodging house affords residence to its keeping.

(c) a hotel - similar to (b)

(d) an excursion steamer is included by virtue of clause 2

(e) a piano in a private house (i) owned - not included

(ii) hired by the month - included by clause 2

(f) a piano owned by a teacher of music - included by clause 1

(g) a piano for sale in a shop - included by clause 2.³¹

[Half page is empty.]

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(i) With regard to a proposed definition that capital consists in products designed to be used in further production,³² criticism has been already made by implication.

It is nearly equivalent to my clause 1 and corresponds to a logical division, but it is not so clearly in accordance with usage or with what is of practical importance as my entire definition. It would require further explanations to determine whether or not it was intended to cover the efficiency consumption of human beings.

(ii) "Products used as aids to further production".

This is similar to (i), but would certainly include efficiency consumption, and has a suggestion of emphasising those products which are not wholly consumed in a small number of acts of production.³³

³¹ I repeat you have given a new variation of the current definition of Trade-capital and have made no provision for the only purpose - though that is of first rate importance - for which "social capital" is needed.

³² ["Production" is underlined by Marshall].

³³ You again omit what I think is the vital point. If production is used in its scientific sense a toasting fork in your room is capable of being included and, if omitted, must be omitted on the principle on which my definition is based, viz. the practical rule, "De minimis non curat lex".

I should be rather glad if you would formulate some important economic doctrines in which your use would be of service. I am not sure that you can. Please kindly try before Saturday.

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Supplementary answer to question on Capital

I can see no³⁴ resting place between regarding Social Capital as the aggregate of the whole wealth of the community, with the possible exclusion of land and personal capital, and whittling it down to something closely resembling trade capital.³⁵ Any calculation of Capital in the sense of total accumulated wealth (with specific deductions) would be an academic problem of actual impracticability; and to use capital thus would be a luxurious use of terms.

But if once we relinquish this use I do not see how we can employ the term so as to include any personal effects at all. I see no fundamental distinction between houses on the one hand and furniture, clothes and books on the other. I certainly regard my books much as my father regards his house (barring income tax considerations) - as wealth held for my own purposes but convertible into cash if necessary.³⁶ Furniture and clothes, more than houses, are apt to have a value to the owner out of proportion to what they would have for anyone else. Hence the unwillingness - because of the unprofitableness - of borrowing on them except in emergency; and pecuniary emergency is regarded as disreputable. But I should doubt whether this holds equally in all classes of society: the upper classes constantly make large sums by letting their houses furnished and the lower classes habitually tide over temporary distress by applying to the pawn broker.

To return: with regard to the point that a term is required

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for all sources of the National Dividend other than land and labour - this throws us back to the definition of the National Dividend. If the N. D. is to include all usances whatever, then it plainly corresponds to social capital in the sense of the total accumulated wealth minus the gifts of nature and personal capital. But this strains the use of the term N. D.

If it is used in a more natural but more restricted sense, then it seems to me that my definition which practically includes under capital all impersonal wealth except land and personal effects (i.e. commodities whose usances or whose products are intended for the owner's consumption) corresponds to this sense.

If the National Dividend excludes the usance of objects owned by the consumer, there is an occasion when my definition would be useful.³⁷

It would also be of service in any estimate of the "business doing" in a country i.e. of the volume of the exchange of usances and commodities. (Though for this the rapidity of

³⁴ Logical.

³⁵ I formed this opinion in 1868, and have never swerved from it. I always act upon it in my own thoughts, and in esoteric discussions with mathematical students, such as Bowley, Sanger, Flux, Lawrence. But this has avowedly nothing to do with the question at issue. That question is: How is the traditional doctrine as to the national income being divided out between Land Labour and Capital - a doctrine which you find in the economic classics of every country, to be explained to non-academics. That is a matter not of logic, but of practical experience.

³⁶ Quis negavit?

³⁷ But in ordinary usage it does not. That is the fact which you persistently ignore. Ordinary usage always counts houses in. For instance ask X what Y's income is. If Y owns his own house the answer is sure to include its rent. It may be £ 500 salary, £250 from securities, £ 70 from the house in which he lives. If Y were asked the question and were to suppress this last fact, he would be suspected of fraudulent motive.

turnover is also required).

But I admit most of your points and would submit this double definition.

By social capital is meant: the entire impersonal accumulated wealth of any community with the exception of the gifts of nature.

By Capital (or Trade Capital) is meant: Social Capital minus commodity of which the usance or ultimate production is intended for the owner's own consumption.

In theoretic problems the first is least complicated; the second

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corresponds the more closely to common usage.

To each corresponds a sense in which "National Dividend" may be taken.

Although the first may be brought into closer correspondence with usage by the principle of "De minimis ...", it is certain that the aggregate for the whole community of personal effects (excluding houses) is really a small quantity in comparison with trade capital?

With increasing prosperity is it not likely to become very considerable indeed? And, in any case, is not its growth an important indication of increasing well being?

(In my original definition I intended to exclude - though I did not, as you pointed out, exclude - agents of further production of which the ultimate product is consumed by the owner)

I am still inclined to think that to regard capital as corresponding to income, income being supposed to include those usances which are as a rule expressed in money form, is intolerably vague.³⁸

(I shall be unavoidably absent from Thursday's lecture).³⁹

³⁸ ["Intolerably vague" is underlined by Marshall] I say it is arbitrary, but not vague.

³⁹ My opinion is that, having been tested in all its details, and corrected, by a long series of legal decisions, the results of which are technically expounded in many treatises, and are, in their broad outlines, known to everyone, it is less vague than almost any other definition in economic science. This fact may interested [sic] you. In my Principles I introduced many new terms. Critics abused me violently for it. Every one of them is now adopted more or less by English and American writers, with one exception. The term "usance", which satisfies for me a more urgent want than almost any other, seems to meet no general want, and I have never seen it used. This influenced me when rewriting my chapter on Capital in 1898. I then felt, as I have often felt before and since, inclined to discard the term "Social Capital" and substitute "accumulated wealth", supplemented by "usance". But my courage is still inadequate [See *Principles of Economics*, 9th variorum edition, vol. II, pp. 201-202 and 700].

31.10.05 1. If only those things which owe nothing to labour are classed as land, and if there is no material thing in settled countries of which this can be said, it follows that everything must be classed as capital!

Does it follow?

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Yes, - if we define capital as all material wealth except land, land being understood as in the question under discussion.

No - if we define capital in any other manner.⁴⁰

⁴⁰ "Things" in the first line are economic elements not material things. On no other terms would any of those whom Fetter ['The passing of the old rent concept', *Quarterly Journal of Economics* 1901] attacks accept that statement as representing their views: indeed the sentence would be diametrically opposed to their views if e.g. they were compelled by it to class houses or improved farm as either true rent-yielders or true profit-yielders in block.

31.10.05 2. The cost of houseroom after deducting the value of land has increased and is increasing relatively to things in general in every western country: what are the causes of the change.

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2. Apart from the value of land, the cost of house room per unit (I am not discussing the fact that people spend more on house-room because they desire more⁴¹ of it⁴²) depends on

(i) cost of materials

(ii) the rate of interest

(iii) the security of house property as an investment relatively to investments in general.⁴³

(iv) the expenses of management.

There is no reason to suppose that the cost of materials for a given amount of a given quality of house room has increased relatively to things in general.⁴⁴

The rate of interest, without risk allowance, has slightly risen.⁴⁵

The relative⁴⁶ security of house property is greatly diminished.

On the one hand the habits of speculative builders and sudden changes in fashion due to changed transport facilities have diminished security on the side of the houses themselves.⁴⁷

And on the other the number of rival investments for small people of adequate security has vastly increased through the introduction of limited liability in Joint stock companies.⁴⁸

Before this was the case, house property was preeminently the most desirable form of investment for petty⁴⁹ savings, while the small owner could win some earnings of management by his local knowledge.

The growth of towns and the breaking down of local residential ties make it increasingly difficult for a small owner to manage house property without recourse to a professional

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agent. Thus the expenses of management have to be allowed for at a higher rate.⁵⁰

The check on an increased price of house room formerly afforded by the widespread desire for the possession of house property is greatly diminished: this must be regarded as

⁴¹ ["More" is underlined by Marshall] A larger number of rooms.

⁴² But you ought I hold to take account of the fact that a ten roomed house has not the same meaning now as formerly.

⁴³ A possible cause, but not in practice important save in a few cases. Special taxation on ground values might be paid by a few: but most schemes for this purpose protect "building rent" [On the distinction between "site value" and "building rent" see Appendix G of *Principles*].

⁴⁴ Oh yes there is; though not relatively to labour.

⁴⁵ Only within the last few years.

⁴⁶ ["Relative" is underlined by Marshall] To what.

⁴⁷ I am not sure of this. It is true of houses in town; but I think not of houses near towns.

⁴⁸ But you have allowed for this over under "rate of interest".

⁴⁹ ["Petty" is underlined by Marshall]

⁵⁰ I do not go with all this. When I was young it was common to find a house for sale at about 15 years purchase of the rental, or even less. Now the number of years is higher.

the main cause of the rising price.⁵¹

⁵¹ ["Price" is underlined by Marshall] There are many statements of fact in this answer which seem to me open to question: though I do not claim to speak with much authority on them. But the broad lines of the answer are not as well laid as I should have expected. If you end with a conclusion as to price, you must take account of currency questions. If you substitute "value relatively to commodities in general" for "price", then you must show that the economies of modern methods of production and transport have been as helpful to builders as to the purveyors of commodities in general: and I think you cannot show that. Houses which had a scarcity value twenty or fifty years ago, because they were in fashionable quarters, and were amongst the few built up to the most approved requirements of the time, have indeed fallen much almost every year. And especially is that true of houses built between 1869 and 1875. But I do not think this is generally true of other houses.

31.10.05 3. What have been the chief causes tending to raise or lower the prices of (a) meat (b) coal in England during the latter part of the 19th century?

[No answer]

31.10.05. 4. In estimating that aggregate of the country's output which constitutes the greater part of the national dividend, how would you trim down the following, in order to avoid double entries?

Sheep, cattle, horses

Milk, butter, oats, hay, mangold wurzel.

Cotton, yarn, calico, cloth, clothes, coal, iron, steel, textile machinery

Services of tailors, railwaymen, medical men, retailers, cooks.

Decide whether to take wholesale or retail prices.

Let us assume wholesale where they differ i.e. take the price paid by the retailer and count his services extra.

Include all finished goods: all increase in the whole stock of goods of every kind: all exported goods and all shipping services which lead to increased imports or no exported goods and all net imports save such as due to bringing home a capital on the balance.

With these exceptions include nothing that will enter into the price of any future finished produce e.g. not fodder for live stock, not live stock themselves except horses to be sold off the farm (out of agriculture), if sold to jobbing masters, yes or no according as you propose to include the net earnings or gross earnings of those people.

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4. ⁵²I would exclude the provender (hay, mangold wurzel, etc.) used for sheep and cattle, but include the sheep and cattle used for meat and the milk and butter of those not used for meat.

I would include the oat of horses used for services.⁵³ but exclude horses, except in so far as the stock of horses was increased beyond that existing at the beginning of the period.

I would include clothes and exclude cotton yarn, calico, and cloth used in the making of clothes.⁵⁴

I would include coal used for the warming of human being and exclude all other coal. But I would include any increased balance of the coal in the stock over that which was in stock at the beginning of the period. Similarly with regard to iron, steel and textile machinery. But all other textile machinery and the iron and steel used in its production I would exclude.⁵⁵

The services of tailors I would exclude.

I would include the service of railwaymen attached to the passenger service, and exclude the services of those dealing with goods traffic: - that is to say by milk etc. I mean milk etc. in the hands of the retailers.⁵⁶

I would include the services of medical men but exclude those of veterinary surgeons.⁵⁷

⁵² It would have made your drift clearer if you had started by saying: "I go by wholesale not retail prices, where the two differ."

⁵³ How about horses if used on the farm.

⁵⁴ Deduct imported wool and cotton [,] count exported textiles in all stages.

⁵⁵ Together with the interest, or rather profits, on it.

⁵⁶ Yes.

⁵⁷ Yes.

I would include the services of retailers, and include those of cooks (on the ground that it would be inconvenient to mean by food, food in the mouths of the consumers).⁵⁸

⁵⁸ A very good answer. But you have overlooked some points: e.g. exports and imports.

31.10.05. 5. What considerations are of most practical importance in selecting commodities for use in an arithmetical index number to represent general purchasing power?

Are there any pair of commodities mentioned in the last question which you regard as suitable for this purpose, though mutually exclusive for the purposes of the last question?

Would your answer to the first part of the question be different if the index number were geometrical?

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5. Index numbers.

Before answering the precise question as set, I wish to discuss a point which has troubled me more than once in reading Jevons's chapter on "the meaning of a fall in the value of gold".⁵⁹

Does "is gold depreciated" mean

(a) Is the general purchasing power of gold diminished? i.e. does a given quantity of gold purchase less representative commodity than before?

or (b) Has there been an improvement in the conditions of the production of gold relatively to the demand?⁶⁰

Almost the whole of Jevons's argument is devoted to a consideration of (b). A good deal of the controversy on index numbers seems to me to turn on a confusion between (a) and (b).⁶¹

It is plain that our commodities must be selected on very different principles according as we are considering (a) or (b)

For (a) the price of bread is of primary importance

For (b) the price of pins is as relevant as the price of bread.

For (a) we must choose our system of weighting with considerable care. For (b) any system of weighting whatever would be waste of time.⁶²

(b) is essentially a question in probabilities; we must utilise all the usual methods for eliminating error. Our samples must be numerous and we must choose commodities which are as far as possible independent of one another.

If we are endeavouring to discover a change in the conditions of gold production relatively to the demand, pins are as good as

⁵⁹ [Jevons, W.S. *Investigations in Currency and Finance*, ed by H.S. Foxwell, London, Macmillan 1884, chapter I, section 1. 'Of the meaning of a fall in the value of gold'.]

⁶⁰ I do not think you have the right antithesis. Instead of (a) and (b) I prefer

α a measure of satisfactions in general

β a measure of efforts in general

or (if it must be though I do not like the terms)

α a consumers index

β a producers index.

There is a third dominant index no. which is associated with credit fluctuations and is sometimes called the Traders index.

⁶¹ It is not the kind of confusion which one would expect Jevons of all men to make and I don't myself think he does. E.g. p. 21 [*Investigations*] "It is quite another question how this fall of value is caused".

⁶² I think (b) may be ruled out absolutely if we are considering purchasing power.

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corn, assuming that there is no more reason to expect changes in the conditions of pin production than of corn production. That is the important point.

But a change in the price of pins is almost insignificant in an estimate of the general purchasing power of a sovereign - as I understand that phrase.⁶³

In (b) we are investigating a perfectly definite phenomenon by a method which can only yield probabilities.

In (a) we are treating a vague question (for general purchasing power is a vague expression) with perfectly definite data.

In the one case our difficulties result from the unsatisfactory character of our data and we need the calculus of probabilities; in the other they arise from the inexplicit character of our object and we require practical judgment.

Much of Bowley's argument concerning the unimportance of weights and his general discussion of the elimination of error applies to (b) only. General purchasing power is incapable of mathematical definition; what we require for (a) is some representative scheme which will obtain general acceptance as consistent with common sense.⁶⁴

Much of Bowley's argument and Edgeworth's reply to Pierson⁶⁵ (some writers from many [annotation in the margin]) seem to me to establish that the particular scheme selected is unimportant in so far as the conditions of gold production relatively to the demand is the cause of a change in the general purchasing power of gold. But other considerations as well as this are relevant; and in so far as they are

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relevant, the particular scheme selected is of the utmost importance.⁶⁶ It is possibly true that in recent times the change has been on the side of gold, and hence, as Bowley shows, the particular systems of weighting make little practical difference: but this does not affect the theoretic point.

In determining general purchasing power the problem is to choose a plausible scheme for

⁶³ You ignore the argument on which all defenders of unweighted means depend that a little stick in a part of the river where there are no eddies is a better guide as to its pace than a big log which is struck by eddies.

⁶⁴ [Through the whole paragraph] I have always been an opponent of the tendency to [be] observed in most professional statisticians to rate the importance of weighting low in general. I think they are all right themselves, but that they mislead the public. If they would continually repeat as a warning to the laity the last line of Prop. III on p. 205 of Bowley I should not mind ['The error in a weighted average is the sum of (1) an error due to errors in the *quantities*, similar to the error of an unweighted average, and (2) an error due to errors in the *weights*, which becomes very small when their original quantities are nearly equal'. Bowley, A.L. *Elements of Statistics*, P.S. King and son, London 1902, p. 205].

⁶⁵ [Bowley, *Elements of Statistics*; Edgeworth, Y. 'A defence of index numbers', *Economic Journal* 6 (1896), pp. 132-42.]

⁶⁶ [Through the whole paragraph, on p. 2] I have a very long chapter in MSS on the subject of the measurement of general purchasing power [*Money, Credit and Commerce*, book I, chapter II]: and I assume as obvious that the faults of the arithmetical mean are in operation with regard to changes which affect all prices nearly alike: i.e. especially currency changes. I am glad therefore that you have called my attention to the fact that Jevons and L[ewellyn] Smith think that in this respect the geometric mean has an advantage. I confess I cannot help thinking that they are wrong.

representative commodity, and in this we must be guided by certain practical considerations. We must choose articles for whose price⁶⁷ accurate statistics are available, and we must choose⁶⁸ articles which can be easily graded - to ensure that the prices we are comparing are really for the same article.

The Board of Trade method has the advantage of great simplicity, and all the necessary statistics are to hand. But the method of weighting commodities in accordance with their importance in the import and export trade has no plausibility.⁶⁹ It depends on two assumptions - that on the whole commodities are of the same relative importance in the home and foreign trades, and that most articles of importance occur either as imports or exports. It is plain that these are only partially realized.

The British Association's index number is theoretically attractive;⁷⁰ I do not know how far adequate statistics exist. If, as I imagine, the solution of (a) is sought Bowley is surely wrong to sneer at its system of weights. But I am not clear why

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only raw materials are included. An improvement in the manufacture of some article of primary importance, unaccompanied by any change in the demand-supply conditions of gold, surely increases gold's general purchasing power.⁷¹

Sauerbeck's index number, by selecting several instances of important commodities, while less elaborate than the British Association's, is the same in principle.

No doubt the reason for ruling out manufactured articles, houses, services and other important objects of general expenditure lies in the difficulty of grading such commodity and of obtaining adequate statistics. But any estimate of purchasing power is inadequate which omits them.

N.B. I may have misunderstood the purport of "purchasing power". An index number of the purchasing power of gold, as I have taken it, endeavours to compare the material wellbeing of a man with 100 sovereigns in one year with that of a man in a similar position in another year. For this we must take account of changes of cost amongst necessary commodities independently of any change on the part of gold.

The Jevons method and the Bowley argument against weighting try to eliminate this relative shifting among commodities other than gold because they are answering (b). But

⁶⁷ 1 implies

⁶⁸ 2 [These two annotations are to be read together: the existence of accurate price statistics implies that the articles are easily graded].

⁶⁹ whatever except when we are measuring credit fluctuations: for it is true that imports and exports, or rather exports and some imports[,] are more sensitive barometers of credit pressure than most other things.

⁷⁰ I am of course biased as to that, since I am one of those responsible (as a rearguard to Giffen) for it. But I don't recollect to have noticed any objection which seemed to me valid to its claims as a supplementary index number. I do not remember what Bowley says. B.[ritish] Ass[ociatio]n is not in his index [British Association for the Advancement of Science, Section F, *Variations in th Value of the Monetary Standard*, 1888. See Marshall's *Correspondence*, v. I, pp. 233-35].

⁷¹ I hold that in some phases of civilization and economic development a raw material index number would be absurd and as a young man I always blew out against. But in the particular phase in which we are now, I think its faults are practically small.

Only if you have raw materials and no manufactured [good] you are absolutely prohibited from including personal and professional services.

for (a) this relative shifting may be of the utmost importance, its elimination is the last thing we desire, and the British Association's index number, though inadequately, endeavours to take account of it.

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If gold purchases more representative commodity than before, this may be because gold is obtained with greater difficulty or because the process of making bread is much simplified.

We can establish a probability for or against the former alternative by an inspection of the prices of a large number of commodities taken at random: the knowledge of the change in price of pins is of precisely the same importance as a similar knowledge with respect to bread.

But if we are comparing general purchasing power we must have knowledge of the price of bread and we can dispense with information about pins.

This is the distinction I have been trying to emphasise.

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In answering (a) only an arithmetic index number is possible: after deciding what our representative commodity is to include and in what proportions, we find the cost of this at the prices of different years. If one of these costs be taken as 100, and the others reduced in the same scale, we have our series of index numbers. (Of course as Jevons points out, we might so define purchasing power as to make the harmonic average desirable; but the view of purchasing power suggested above seems most natural).

In answering (b) there is a good deal to be said for the geometric mean, it is easier to calculate, and the results are independent of any particular year. But I see no reason for selecting commodities on a different principle.⁷²

Dr. Laspeyres⁷³ and Jevons were at cross purposes in their controversy over the arithmetic and geometric methods.

For Dr. L.[aspeyres] was trying to answer (a) and Jevons (b) (see pp. 120,121 Jevons Invest.[igations]).⁷⁴

⁷² I think I can show you one.

⁷³ [Laspeyres, E.E.L. 'Hamburger Waarenpreise', in *Jahrbücher für Nationalökonomie und Statistik*, 1864. The article is referred to by Jevons.]

⁷⁴ I think myself that Jevons on p. 121 [*Investigations*, the passage is given below by Keynes] did not mean to take back what he said on p. 21

But I am a heretic, not at all a humble one, as regards the true nature of the faults of Arithmetic and Geometric means; but don't know when I shall be able to deliver myself on this matter.

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J.M. Keynes

Supplementary answer to question on Index Numbers

I have now got the discussion on index numbers in the Blue Book which I had not read when I answered the question. I see that the distinction is made there which had troubled me in reading Jevons and Bowley.

I should have pointed out that commodities of seasonal price are unsuited for inclusion.

The writer in the Blue Book seems on the whole to despise systems of weighting, on account of their somewhat arbitrary character and the apparently small practical difference between different systems in recent years. But while this would naturally be the case during a period in which the conditions of gold production have been the main factor in the change of relative prices, special circumstances might easily arise in which the effect of weighting would make itself predominantly felt.⁷⁵

I omitted to point out the dangers of double entry (e.g. coal and pig iron) and the possibility of allowing for this error by a system of weighting (e.g. if pig iron is included coal must have a less weight than would otherwise be the case). This is of equal importance in answering (a) or (b) and the object of allowing for it would justify a modified use of weighting in (b). This was roughly indicated by the proviso that the commodities selected should be independent. The blue book writer justifies the use of raw materials only

(i) because no trustworthy figures are available for the retail prices of the commodities actually consumed

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and (ii) because the changes in the prices of raw materials, although possibly more rapid and violent than the changes in prices of the manufactured articles consumed, do - on the whole - over relatively long periods of time, afford a fair measure of these changes.

This seems to me true only if there is no long period change in the rate of interest.

In comparing index numbers of purchasing power over a long period, if our index numbers are based on the prices of raw materials only, some attempt ought to be made to allow for changes in the rate of interest.⁷⁶

Changes in the price of labour would - broadly speaking - be already allowed for; but the rate of interest affects the price of retail commodity out of all proportion to its effect on the price of raw material.⁷⁷

⁷⁵ See p. 2 [of Keynes's paper].

⁷⁶ I am not sure this is very important. For there is more interest in the cost of many raw materials than in the extra cost which is added by manufacturing them. Think of a 2000 feet coal shaft.

⁷⁷ This is a very powerful answer. I trust your future career may be one in which you will not cease to be an economist. I should be glad if it could be that of an economist.

I shall be compelled in lecture to say a good many things on this subject which you know already.

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Arithmetic and geometric Index numbers⁷⁸

pp. 19-21 Jevons is not considering purchasing power, but average prices with a view to detecting a change on the side of gold.⁷⁹

His arguments in the last two paragraphs of p. 19 and p. 20 are irrelevant on any other supposition: for he is deliberately attempting to eliminate changes amongst the commodities themselves.

For an index number of purchasing power, the geometrical mean seems to me to be out of the question.⁸⁰

But with regard to the investigation on which Jevons was engaged, his argument on p. 121 still seems to me valid: - "Any change in gold will affect all prices in an equal ratio; and if other disturbing causes may be considered proportional to the ratio of change of price they produce in one or more commodities, then all the individual variations of prices will be correctly balanced off against each other in the geometric mean, and the true variation of the value of gold will be detected".⁸¹ It is essentially a method of probabilities and can, of course, be upset by an arbitrarily selected instance of its use.

Corresponding to your instance of a commodity whose price drops to zero, we have, to counterbalance it, the possibility of a commodity's becoming unprocurable i.e. of infinite value (e.g. if the receipt for yellow Chartreuse were to be lost). Jevons's method would cancel these off against one another; and in any case a method of probabilities can be rendered useless by extreme instances. But, as I say, with an instance of zero price and one of infinite price (or as I should prefer to say, an almost negligible price and a prohibitively high one) the G.M. is unshaken; but the A.M. is discredited after the same method as you discredited the G.M.⁸²

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There are certain qualities of great importance however an index number is constructed. i.e.

⁷⁸ [This is not an exercise paper, but an undated note whose first page is heavily annotated by Marshall.] Perhaps we can have a talk about G.M. after next Saturday lecture not before, for part of what I have to say will need find place between 12 and 1.

⁷⁹ [Marshall substitutes "standard" for "average" and writes:] "'average prices' seems to me to be the simple inverse of general purchasing power in terms of commodities.

The true division seems to me that between a satisfaction and an effort.

⁸⁰ Weighing is a remedy for the error in the Sawdust story. That is what I want to bring home. The same is true as to Chartreuse. [The Sawdust story is an example in which the price of the commodity falls to zero. See *Money, Credit and Commerce*, Appendix B, p. 279 n. The example of the Chartreuse, whose price becomes infinite, is explained below in Keynes's text.]

⁸¹ [Jevons, *Investigations*, pp. 121-22] I never doubted the truth of this. But I hold that the merit claimed for the G.M. is possessed by the A.M. whether weighted or not. I hold that if a variation is due to some universal cause, its effects (mixed up with others) will be shown by any mean whatever: and that, if there are no other causes, *any* mean will represent that general cause exactly. A single price would do the same.

⁸² I had not overlooked this difficulty. But in practice it is not a grievous one. In the hurried remarks which I made, I did not apparently make my meaning clear. The matter is far too long for writing. In substance it is this. The faults patent in A.M. are due to difficulties of weighing. The defenders of G.M. seem to think that there are no such faults in G.M. I came to the conclusion that there are; and invented the Sawdust story, to bring out my point. I agree entirely with the passage you have underlined: but I do not follow what you say about "cancelling" in the line above.

- (i) definitiveness: if there is official standardization, that is an advantage
- (ii) continuity of returns: Bowley's methods have put this down from the first to the second place in importance
- (iii) openness of markets: it must be certain that the purchases recorded are really representative
- (iv) largeness of volume or representativeness: if there is no controversial spirit in the inquiry, e.g. Jevons or Sauerbeck, if a man is working to satisfy himself, the Jevons line of considering a zero commodities chosen as being representative, taking an article of large volume cet. par. on the ground of the lesser possibility of error and unusual fluctuations, is satisfactory. Wheat fluctuations are so considerable that it might be advisable to smooth out wheat prices for index number purposes: keeping to the prices of individual years for commodities affected by fluctuations of credit. But if bias is suspected, and you have chosen representativeness rather than number of commodities, controversy is difficult

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The only index number perfectly satisfactory from a formal point of view is that based on the price of exports and imports. The result can be worked out mechanically.

With an index number based on things in general there is much more room for controversy as to method.

The Board of Trade index number fixed by Giffen satisfies the first condition almost perfectly.

G.[iffen] left the mechanical method by depending on its own judgement as to what year represented average price and average volume for different commodities.

Only weighted index numbers, or those practically weighted by a grouping of representative commodities represent a fact in the real world.

For there is no specific average of prices.

An average unweighted index number depends on the blindness of chance as regards large numbers. The number of commodities usually employed in index numbers is not nearly large enough to give this method fair play.

The Jevonian method of taking more instances of important commodities is good if the man who uses it has great insider knowledge.

A priori the chance of a good index number on Giffens method seems slight: a posteriori one's confidence is strengthened. There is an extraordinary conformity between index numbers in the same country based on altogether different methods.

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It is often to[o] wise to take the middle year of the period under consideration as a base year: (as a matter of fact the wisdom of this step depends on whether the change is due to changes in Supply or Demand). Simplicity and multiplicity are the chief requirements.

9.11.05 1. In estimating national prosperity, why are income statistics a better guide than those of wealth?

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Income statistics give the flow of commodity for consumption during the period in question, they constitute a nearer approximation to the national dividend than wealth statistics; for the former include the earnings of labour and capital, and the latter primarily measure the growth of capital. The growth of capital may be a useful indication of national prosperity, but it may be exceedingly deceptive: increased expenditure on education and personal capital and highly skilled or artistic services is an essential concomitant of increasing national prosperity. But these causes are in their immediate result calculated to diminish the growth of wealth. At certain stages of national progress prosperity may be usefully measured by the increase of material savings, but not at all stages.

But income statistics, particularly if they are accompanied by information as to distribution, and checked by index numbers, are an invaluable guide.⁸³

⁸³ The vital point is that income is the benefit which a nation derives from its property and its labour. Its wealth is only the capitalized source of a part of its income. And this capitalization may be lowered 25% (say by £ 3.000.000.000) by a fall in the number of years at which capitalization is made, which is caused say by a long continental war in which England is not involved, which on the whole benefits England, but raises the rate of interest from 3% to 3 3/4 per cent.

9.11.05. 2. Enumerate briefly the chief causes which are increasing the size of individual businesses at the present time.

And describe changes which are assisting small firms in competition with larger.

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Chief causes increasing the size of individual businesses:

1. Increased facilities of transport: a larger area than before can be served from a single centre.

2. The uniformity which has been increasingly introduced into manufacturing processes, enabling exceedingly large businesses to be highly centralized in management without losing⁸⁴ strength.⁸⁵

3. The use of machinery has necessitated a very large capital investment in fixed plant. e.g. A sugar refinery requires 3 to 5 million dollars capital.⁸⁶ Highly specialized machinery for each process is only economical when production is upon a large scale: and in some cases there may be great specialization in particular factories.

⁸⁷

4. Full scope is⁸⁸ offered (i) for the ability (ii) for the ambition of exceptionally gifted managers of industry. Chairman Gates told the Industrial Commission that the American Steel and Wire Co. was formed because its organizers wished to be the wire manufacturers of the world.⁸⁹

5. The profits to individuals which can be obtained from producing and financing large concerns - e.g. U.S. Steel Co.⁹⁰

6. Particular economies of production on a large scale: e.g.

(i) in advertisement - especially in the development of export trade

(ii) in commercial travellers - especially if the same firm trades in cognate commodities. Some of the American Trusts have effected large economies by this method.⁹¹

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(iii) the economical use of byproducts.⁹²

(iv) the convenience to customers if many qualities of goods of a similar nature can be supplied by a single firm, and if the stock is sufficient to supply the order at

⁸⁴ much.

⁸⁵ , while in some direction they gain a little.

⁸⁶ There is a dispute as the amount required for sugar refinery. I do not recollect the exact figures just now.

⁸⁷ [Referred to case 4] This is combined ownership it is included in the question, but the transition should be noted.

⁸⁸ asserted by many persons with great knowledge, but also great bias to be

⁸⁹ Facts prove that such statements are too strong: as to whether they are much too strong, facts as yet give no certain answer and we must judge partly on general grounds.

⁹⁰ Another transition.

⁹¹ [Referred to case 6] Goes more with n. 3.

⁹² In a few cases.

once.⁹³

(v) the losses from fluctuations of trade may be less; for the actual plant which is kept employed can be run at its full strength and the rest temporarily disused.⁹⁴

(vi) the power of spending large sums on experiment. e.g. Maxim's works. Burroughs and Wellcome.⁹⁵

But there are, on the other hand, certain tendencies working in the opposite direction which may become of increasing importance as time goes on and at least prevent individual firms from maintaining the same proportion relative to the total volume of production as at present.

The most important are:

1. The spread of specialized information by means of such agencies as trade newspapers. The small producer is thus enabled to keep up to date in his knowledge of new processes and new machinery.
2. The growth of subsidiary industries such as those for the manufacture of machinery.
3. The use of electricity for motive force. This is likely to prove eventually by far the most important change on the side of small producers. Each industrial district will have its central power station and individual producers will be able to buy exactly the amount they wish. It will be possible to enjoy the economies in the production of motive force on a large scale without increasing consolidation

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on the part of individual businesses.

4. The localisation of industries in certain centres where the advantage of centralisation can be obtained although production is still distributed amongst a number of independent firms.⁹⁶

To treat the question more analytically, the apparent instability in supply in cases of increasing returns, by which it would appear theoretically that any firm which obtains a start must ultimately absorb the whole business, can be partially explained away without reference to economic friction or to the influence of time. For the economies of production on a large scale may depend more on the total volume than on the method of distribution between the various sources of supply: i.e.

if y is the total production, y_r the production of the r th source of supply; p_r the marginal price in the r (th) source we may have

$$p_r = Q(y)^{97} + f_r(y_r)^{98}$$

$Q(y) + f_r(y_r)$ may always obey increasing returns,
but $f_r(y_r)$ diminishing returns after a certain point is reached.

⁹³ In a few cases.

⁹⁴ This is asserted boldly: but there are strong few contras.

⁹⁵ In some cases.

⁹⁶ Yes.

⁹⁷ External economies.

⁹⁸ Internal economies.

Thus so far as each individual industry is concerned, there is diminishing returns. The kind of considerations indicated⁹⁹ above increase the importance of $Q(y)$, i.e. the part of the price dependent on total and not individual output.¹⁰⁰ In proportion as $Q(y)$ asserts itself in future, small producers will be enabled to hold their own:¹⁰¹ and it certainly appears that industrial progress in the future may

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consist of improvements which, while very rapidly diminishing the total cost of production as the volume of production increases, will not assist large individual producers against small producers to anything like the same extent.

A full discussion of the point raised above would involve the analytical difficulties of a general treatment of comparative supply.¹⁰²

⁹⁹ Just

¹⁰⁰ Yes

¹⁰¹ In a full discussion (which I have already in print!) it is necessary to dwell on the two modern sets of tendencies one tending to increase $Q(y)$ relatively to $f_r(y_r)$, the other tending in the opposite direction.

¹⁰² A good answer.

Perhaps the most important points you have omitted are:

in group n.1, the importance of supplies of coal, minerals, or other raw material or implements, which tends to help very big firms in some industries especially iron and steel

per contra organized produce markets, which help medium firms in cotton and other industries.

But the whole subject is too large for short treatment.

A good answer.

9.11.05 3. Supposing it to be asserted that the railway service of one country is better than another, what facts would you require to enable you to test the statement. Arrange your answer under the heads:

- (i) charges
- (ii) rapidity of service
- (iii) other advantages offered to the customer
- (iv) physical configuration of the country
- (v) density of population

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Before proceeding to answer this question in detail, there are certain warnings which ought to be pronounced with regard to any practical attempt to make a total comparison between the railway service of different countries. The matter will be argued under several different heads, and there is no method of making these different considerations altogether commensurable. There is no practical rule for adding and subtracting advantages and disadvantages of different kinds. When we have as many considerations before us as is possible, the best we can do is to summarize them in some general statement based rather on common sense than on any scientific principle.¹⁰³

This difficulty may become almost insuperable if the countries to be compared enjoy very different physical, social, and economic circumstances. Take for instance the passenger services of India and U.S.A.: in the first case the average fares are less than ¼ d. a mile, because the passengers, having a high marginal utility for their money, will tolerate a slow service and what to an American would be the greatest discomfort as regards accommodation.¹⁰⁴

A second warning is necessary as regards statistics; the existence of the necessary statistics is assumed in the latter part of this answer. But in practice the greatest care must be taken to ensure that the *prima facie* statistics really deal with corresponding facts in the different countries. For instance in Great Britain there are no satisfactory statistics of the low-mile freight business, and the passenger-mile statistics are hopelessly vitiated for purposes of comparison by the difficulty of allowing for season ticket travelling.¹⁰⁵

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Again Prussian¹⁰⁶ railways¹⁰⁷ (and for that matter English railways) probably deal with more suburban traffic than is the case in U.S.A., where tram and trolley lines take the bulk of the traffic out of the hands of the through roads.

The Austrian zone tariff is very troublesome for purposes of comparison:¹⁰⁸ but instances of such difficulties could be multiplied. The answer will be divided into two distinct

¹⁰³ Yes.

¹⁰⁴ [Accommodation in Keynes's writing, The second "m" is inserted by Marshall] This is a relatively small element. The American service could not be 20% cheaper if it were on Indian methods.

¹⁰⁵ Yes.

¹⁰⁶ ["Prussian" is crossed out by Marshall] Westphalian and Rhineland.

¹⁰⁷ This would be much more true of Saxony.

¹⁰⁸ A stupid obsolete contrivance.

heads - passenger and freight service. For the most part different statistics and different considerations are relevant in the two cases, and any weighing of the two against one another is almost impossible. There will be no distinct treatment of the freight service of such perishables as milk and newspapers or of mails, for which the facilities are very closely bound up with those for the passenger service. If, as is probable, the passenger service of Prussia is superior to that of USA and the freight service inferior, it is difficult to see on what principles we are to decide as to which country has the superior railway service on the whole.¹⁰⁹

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I The Freight Service

[I] (i) charges - the simplest prima facie test is to be found in the average charge for ton-mile: but for real comparison further considerations are essential. Some of these will be considered under the subsequent heads: of the rest the following seem to be of the greatest importance:

[I (i)] 1. The length of the average journey. It is plain that the increased terminal facilities and operations which are necessary if the average journey is short justify a higher charge per ton-mile than if the journeys are long.^{110 111}

[I (i)] 2. The value of the freight per ton. If a large proportion of the traffic is of small value in comparison with its bulk, this part of the traffic¹¹² must bear a small share of the expenses of the line per ton than the more valuable part: this is a necessary condition of the existence of such traffic.¹¹³ If therefore we are considering the value of the service to the consumer, we are aided by statistics giving the percentage of freight charges to the total value of the commodities carried.

[I (i)] 3. The average bulk per ton. e.g. (2) discriminates between manufactured silk and pig iron: (3) between pig iron and cereals (not that 2 makes no discrimination on this score).

[I (i)] 4. The size of individual consignments. It is¹¹⁴ cheaper to move freight when individual customers can fill carloads, than when a carload has to be made up by a number of different consignments.

[I (i)] 5. The possibility of return freights. e.g. the consignments in one direction may be cheap and¹¹⁵ bulky, and in the other of high value but small bulk.

[page 4]

I (i) 6. The prices of labour and fuel. The lack of conveniently situated coal mines can

¹⁰⁹ You ought to have added: but two (rather vague) principles can be laid down, as to which the important thing to be noted is that each has its own sphere of application: and often the two spheres are not distinguished, but bits of the two principles are applied indiscriminately in either sphere.

¹¹⁰ Other things equal, but often they are not.

¹¹¹ A.

¹¹² Always does and often [inserted].

¹¹³ This is not well put.

¹¹⁴ A little.

¹¹⁵ ["Cheap and" and "of high value but" are crossed out by Marshall] Not needed.

hardly be laid on the railway service.

Summed up, the above considerations depend broadly on the size of the country, the scale of individual production, and the character of its industry.

If the country's characteristics are large (e.g. large geographically, large scale production, large bulk manufacture) the ton-mile charges ought to be small. The difficulty of obtaining return freights of equal bulk tends in the opposite direction.^{116 117 118}

[page 5]

I (ii) rapidity of service

This is not very important as regards freight - unless perishables (e.g. dairy produce) are an important article of freight.¹¹⁹

Less rapidity of service, however, can be expected if the density of population is small, and carloads have to wait before it is possible to make up a complete train.

[I] (iii) other advantages

1. Terminal facilities must be taken account of, and the extent of free delivery (e.g. there is more free delivery in G.B. than in U.S.A.).

2. The extent to which shippers own the freight cars, and the allowance for demurrage.

3. Miscellaneous discriminations - e.g. depending on the size of individual consignments (see I (i) 4.).

[I] (iv) physical configuration

The effect of the size of the country has been noticed already. Allowance must be made for the initial expense of the road [only however when increased expense is due to the greater solidity and permanence of the original construction (e.g. that of G.B. over U.S. so far as early construction is concerned)].¹²⁰

[page 6]

I (v) density of population

Some of the effects of this have been noticed already.

It should be pointed out that the relative sparseness and concentration of the population is often more important than the square mile density averaged over the whole country (see

¹¹⁶ **B.**

¹¹⁷ **A** and **B** ignore the rule that the costliest lines per ton-mile are those which cost least per mile of making, because they are lying idle nearly all day.

P.S. I see you point at this in **C** on p. 6.

¹¹⁸ The answer is good and it shows in particular a much improved sense of the true relation of economic figures to realities; but it is rather of the nature of a fragment.

Oh I see it is not finished.

¹¹⁹ Or fashion goods, or even goods of which intermediate dealers keep but a small stock and accept orders based on samples or illustrated catalogues. Again it [rapidity of service] is often important for things wanted by the builders and because work must be partially suspended till they come. "Small parcels" - up to say 5 cwt - carry almost all these cases.

¹²⁰ [Square brackets in the original] Yes indeed: for there is nothing better in the world than some U.S. lines now.

I. (ii)).

Large centres of population separated by long distances ought to lead to greater cheapness in freights than a more uniformly dense population, giving the same average density.

Nevertheless statistics giving the number of miles of railroad per square mile, combined with statistics giving the population per square mile [,] are of value.¹²¹

Plainly Belgium would be better served than U.S.A. with an equal number of miles of railroad per square mile: and Middlesex better served than Cambridgeshire with the same quotient of length of railroad by population per square mile.

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II. The passenger service

(i) Charges. The first rough test must be the charge per passenger-mile. The length of the average journey is not very important (unless there are very large variations due to the inclusion or non-inclusion of suburban traffic).

It may usually¹²² be assumed that there will be many passengers going one way as going the other.¹²³

(ii) Rapidity of service. This is most important but precise statistical comparison is difficult.

(iii) Other advantages. This is most important and explains great prima facie differences of charge in different countries.

We must take note of the number of different classes provided, and the accomodation implied by a given class: but anything very precise is impossible.

American passenger charges¹²⁴ are possibly no dearer than elsewhere for the accomodation provided. But the lack of low class accomodation¹²⁵ is so marked in comparison with other countries as to make criticism fair. Comparison with India is not equally justifiable: But the facilities for cheap travelling are markedly less than in G.B. and very less indeed than in Germany.¹²⁶

After comparing the charge per passenger mile and allowing for differences in accomodation, it is still useful to notice the average number of journeys taken and the average number of miles travelled per head of population per year.

We get the remarkable result, for instance, that the average

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number of journeys taken yearly is 27 in G.B. and only 7.5 in U.S.A.: while despite the great distances in U.S.A. the average number of miles travelled by each inhabitant in a

¹²¹ C.

¹²² ["Usually" is underlined by Marshall] Yes.

¹²³ But not at the same time of day even in non-suburban traffic. E.g. Royston to London in the morning, back in the evening. The same is true of much seaside traffic.

¹²⁴ ["Passenger charges" is underlined by Marshall] ? minimum.

¹²⁵ [The second m is inserted by Marshall.]

¹²⁶ I do not follow this. I think you mean that though the minimum charges in the U.S. are higher than on European Continent, the cheap fare accomodation on the Continent is bad.

year is slightly less than in G.B.¹²⁷ (N.B. I am altogether unaware how the difficulty of allowing for season ticket holders has been dealt with in these statistics, or how far the astonishing difference is explained by the inclusion or non inclusion of suburban traffic) In considering the accomodation provided such points as the following ought to be noted:

1. The physical configuration of the seats (if any).
2. The lighting (e.g. gas or electricity).
3. The crowding of train (e.g. Italy of to-day).
4. The courtesy of officials (e.g. English guards and Prussian conductors).¹²⁸
5. Lavatory accomodation.
6. Station accomodation (e.g. Waterloo and Paddington).
7. Punctuality (e.g. Italy of to-day).
8. Through carriages and connexions.
9. Sleeping and eating accomodation.
10. Safety.

We ought, if it were possible and we had sufficient knowledge, to deal separately with regular traffic and special reductions for excursion and return fares. A high normal charge is of less account if cheapness can be secured at the expense of a little ease and arrangement. For the high normal charge tends to affect mainly those to whom the marginal utility of money is small.

Of further points to be considered under this head we may note:

1. Whether free luggage is allowed. There are three systems - a. free luggage without registration as in England, b. little or no free

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luggage with registration as on the Continent, c. free luggage and registration as in U.S.A.

No one can travel on the Continent without much luggage as is usual in England, without realizing how profoundly this charge modifies the apparent cheapness of the fares.¹²⁹

This practice (b) reacts also on the accomodation: the hand gepäck of rural Germany is a thing to be reckoned with.

2. The great cheapness of return tickets in Germany ought to be strongly allowed for in any comparison.¹³⁰ It would surely be wise to extend the system to G.B. (where it already obtains for 1st class tickets).

¹²⁷ ? I do not follow this. But I know why the number of journeys (exclusive of season tickets) per head per year is low in U.S.A. and why the average trip is not very much longer than in Germany and France. Of course there are no statistics for U.K.

¹²⁸ You remind me of medical practitioner who had a large smile, and put it in the bill.

¹²⁹ But if he knows the ropes and has very heavy luggage, it costs him less than in England. I took 8 CWT close to the Italian frontier of Austria this year, and to a place six hours from a railway. In proportion to the distance my charges were relatively low - about £ 3.10 or £ 4 each way, all included except extras for excursions from the main track.

It is wonderful how much has been done recently in this direction in Germany.

¹³⁰ This is a very difficult question. I sometimes think one way, sometimes the other. You must remember that the working classes do not so often buy return tickets as they will to do, and they are discriminated against in England.

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II (iv) The same general remarks apply as in I (iv).

(v) Density of population is of the utmost importance in the comparison of the charges for passenger traffic. The rate of increasing return up to a certain point in railway traffic is unusually great.

Most of the considerations of I (v) are also applicable here.

(vi) Frequency of service is important: but like many points raised in the part of this answer which deals with passenger traffic, definite or adequate statistics seem almost out of the question.¹³¹

[page 11]

There are one or two general considerations which ought not, perhaps, to be altogether omitted in a wide comparison.

1. The honesty of railway management. e.g. unjust discriminations between individuals or localities.

2. The conservation and stability of railway policy and railway charges. Stability combined with progress provides a better railway service than an alternation of monopoly and rate wars, of inordinate profits and official receiverships.

3. The degree of State control and the nature of railway legislation in different countries.

4. State or private ownership. e.g. in Prussia a part of the charges may be legitimately counted as a contribution in lieu of taxes.¹³²

5. The extent to which railways have been built

a) for military purposes

b) for development of trade or population not existing before the building of the road.

The benefit of such roads to the community and the relative excellence of the service is not adequately measured by such considerations alone as have been given weight in the earlier part of the answer.

c) for social purposes e.g. prevention of famine.¹³³

¹³¹ I do not agree about this. I think statistics can be got; and indeed this is the point on which I always lay chief stress when arguing with Germans who sing the praises of their Government on railway administration.

¹³² Yes.

¹³³ A brilliant answer. Its only considerable fault is indicated on p. 2.

9.11.05 4. In what sense is it true and in what false that a monopolist adjusts his price to "what the market will bear"? and that the producer in a competitive market must keep close to cost of production

[page 1]

If expensive and permanent plant provides a number of different services, after the plant has once been set up, the most profitable method of fixing the price is as follows: fix the price of each service separately at the price a monopolist would charge if the cost of production of that service were equal to what is actually only the additional cost of producing the service over not producing it, assuming the permanent plant to be there in any case. This is the principle of charging what the market will bear; the amount of the fixed charges defrayed by the scale of each service is determined solely by the demand for that service.

After the plant is set up the¹³⁴ monopolist ought, in any case, to adopt this method for his prices. He will only have entered the business wisely, if there is a prospect that the services provided taken as a whole will defray the fixed charges. If the above method will not yield him a profit, no method will.¹³⁵

In this sense it is true that the monopolist charges what the market will bear; but allowance must be made for the special expenses in connection with the supply of any service.

But suppose a competitor to enter the field, the tendency will be to fix¹³⁶ the charges for each service, at the point at which competition would fix it if the special cost of producing the service were the sole cost.

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It is plain that such competitive cutting of prices must end in ruin to both parties; at the same time there is no method by which competition can automatically¹³⁷ decide what proportion of the total cost of production each service ought to bear.

There will, therefore, be a tendency to instability - an alternation of monopoly, rate wars, bankruptcy -, unless some tacit or open agreement is come to between the competitive parties as to how fixed charges are to be shared between the different services.¹³⁸ Thus even in a competitive market there must of necessity be some reference to "what the market will bear" in fixing prices; and this is inevitable because in the case of joint supply of this¹³⁹ kind there is no method of saying what the cost of production is of each service separately.

Nevertheless in a competitive market, after some convention (probably determined by the elasticity of the various demands) has been openly or tacitly adopted amongst the competitors, the profits on the whole cannot exceed what is normal without calling fresh

¹³⁴ Abstract.

¹³⁵ This is an admirably clear statement of the pure monopolist policy in the abstract. But the question rather points to the non-existence in real life of such a person, at least in any considerable affairs.

¹³⁶ There may be a tendency to fix.

¹³⁷ "Automatic" competition belongs to the mathematical world on the other side of the looking glass.

¹³⁸ This may be so, and often is: but also often it is not.

¹³⁹ ["This" is underlined by Marshall] What kind? I hold that there are many kinds of joint supply of which it is not true.

competitors into the field. Thus total cost of production maintains a general controlling influence over price, although individual cost of production does not determine the price of each separate service.

If a plant supplies services A B C D at prices $\alpha \beta \gamma \delta$ in the proportions a b c d, $a\alpha+b\beta+c\gamma+d\delta$ must keep close to cost of production of $aA+bB+cC+dD$ but there is no simple relation between α and what we may estimate to be a fair account of the cost of production of A.

Perhaps the services of retailers and of transporters are¹⁴⁰ the most important instances of the applications of this theory.¹⁴¹

¹⁴⁰ Among.

¹⁴¹ This is an admirable paper. It is one of the most interesting I have ever seen. It still has traces of the old tendency to talk of things in the real world as they may be in a conceivable world. Your propositions are often too unconditional and if you were to apply them in practice, you would come to grief. But you are straining yourself to take account of realities; and comparatively seldom lash out into "The world behind the looking glass". I repeat what I said before, that I would like to see you become a member of some economic staff, and especially of this. But I know the world is large.

9.11.05 5. Is it a sound proposal to determine agricultural rent by a sliding scale according to the prices of produce?

[p. 1]¹⁴²

Sliding scales of wages amount to determining wages by an index number based on one commodity.

Coal mines is the simplest case; for only little but coal is used. Here the sliding scale was satisfactory, despite its abolition.

With iron also it is fairly good, for although coal is important, coal and iron tend to move together.

With cotton the case is different; here there would be grounds for varying wages inversely as the raw price of cotton. For if they are to vary with anything directly, they ought to vary with the margin (i.e. the difference of price of the manufactured and raw materials).

And the margin tends to go down when the crop is scarce

Agricultural rents are not analogous to coal wages; a sliding scale method (as practiced in India) may be abominable.

It is equivalent to a collection of rent by a certain amount of produce. (Of course the amount varies according to the fertility and the amount of labour required)

When the crop is small, the price is high; if you take a given quantity of it, you are taking more than a money rent. Such a system works the wrong way. When a peasant is starving he has to pay more. For a capitalist tenant no doubt the case is better: the man who does not keep an appreciable portion of his crop for his own subsistence gains by a bad crop.

In England now the farmer is generally better off with a good price than with a low price. (Though the influence of Russia, America etc¹⁴³

[p. 2]

And in America, an exporting country, it would not be at all a bad plan.

But nevertheless not a good plan - owing to its complication. The scarcity of scales for particular districts or particular farms would be great. The best theoretic solution is this - a certain proportion of the produce, not as in India a certain quantity of produce - The Metayer System.

This also has its disadvantages; for the tenant tends to turn his labour to such services as accrue to himself solely. It is practically universal in the Southern West of U.S.A. - In the Mississippi Valley the cultivation is by negroes and on this system. Here it works well.

In practice it depends on general customs and characteristics.

¹⁴² [The following two pages are kept in the Archive as if they were part of the answer, though they bear no number, unlike the others, nor any comment by Marshall.]

¹⁴³ [One or more pages seem to be missing.]

23.11.05 1. What causes govern variations in the amount of employment in a country from decade to decade, assuming the conditions of foreign trade to remain nearly unchanged?

[page 1]

By "amount of employment" we may mean the total volume of labour demanded and consumed, in which sense the amount of employment in England is always greater than in Holland; this sense is employed in the statistics of Pennsylvania where comparative statistics of the total number of workmen in the several trades are kept. More usually, however, it signifies the opposite of "lack of employment" and is measured by the ratio of the amount of labour employed to the amount offered for employment,¹⁴⁴ or sometimes by the ratio of the number of labourers employed to the number of those seeking employment. To put this otherwise, the amount of employment is the number of labour days worked in a year / the no. of workmen x no. of working days in a year, sometimes (if greater accuracy is sought) allowing for short time and over-time, and sometimes not. [Another method (e.g. in Germany) is to compare the no. of vacancies declared to the candidates applying].¹⁴⁵

Statistics (these only apply to certain grades of labour) of employment in England (in this latter sense) show that for the last forty years it has undergone a regular oscillation of somewhat uncertain period, averaging about 7 years, in which there is only a small variation in the max. and min. points.¹⁴⁶

If therefore, we wish to compare long period variations from decade to decade, smoothing out minor fluctuations, and seeking evidence for any general trend, we shall do well to take for our comparisons the periods of each complete oscillation, rather than to cleave strictly to exact

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intervals of ten years.¹⁴⁷

A part from foreign trade the main long-period causes are to be found in the general organization of industry under the following heads:

(i) The growth of world markets through the agency of improved transport; so far as the supply of raw material is concerned, this ought to reduce fluctuations; but in so far as it increases the difficulty of foretelling the demand for manufactured products owing to the greater field of consumption with regard to which information is required, it has been urged that the dangers of overproduction are increased. A small number of foolish or speculative manufacturers can involve others besides themselves in ruin, and bring about a general, though temporary, depression.

(ii) The extent of the prevalence of a "speculative"¹⁴⁸ or gambling spirit, or of an

¹⁴⁴ Unconditionally or at a high(*) minimum price?

(*) "High" here means relative to times before the modern era of rapid economic change, and therefore increased uncertainties in most directions, except the supply of harvest products.

¹⁴⁵ [Square brackets in the original.]

¹⁴⁶ The statistics forty years ago were very fragmentary.

¹⁴⁷ Yes.

¹⁴⁸ [Inverted commas by Marshall] In the dyslogistic sense.

oversanguine outlook exaggerating the booms and, in consequence, the subsequent depressions also. It is argued that the separation of the functions of manufacture and of speculation, which the development of produce exchanges has brought about, tends towards increased stability.¹⁴⁹

(iii) The organization¹⁵⁰ and mobility of labour by means of labour bureaux and a widespread spirit of enterprise.

(iv) The increased use of machinery may have several various effects:

(a) In so far as it means expensive permanent plant, it may prolong and intensify the evils of overproduction and lack of foresight. It hinders the mobility of capital.¹⁵¹

(b) In so far as it diminishes highly specialized hand labour and develops

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a class which can easily shift from the management of one type of machine to that of another, it increases the mobility of labour.

(c) In so far as it leads to the use of labour-saving appliances relatively fast in reference to the growth of capital, it may increase the temporary redundancies of labour.

(v) The growth of the machinery of industrial arbitration and conciliation, diminishing the average loss by trade disputes occurring in each period under consideration.

(vi) The decrease of improvident propagation, due to improved poor laws, or a higher standard of comfort. Unemployment will be diminished by the substitution of intelligent for blind custom and habit or recklessness. (There are no adequate statistics of unemployment in the lower grades of labour).

(vii) The increase or diminution of certain special causes of such importance as to be unavoidably introduced even in long period computations - e.g. national and social stability, or the large unproductive expenditure of capital on war.

(viii) The relation of the growth of capital to the growth of population; this has been incidentally referred to under previous heads.¹⁵²

¹⁴⁹ Yes.

¹⁵⁰ "Organization" by trade unions may be a chief cause of unemployment. I shall not have time to go into it during this Term. I will return to it from another point of view next Term.

¹⁵¹ There is truth implicit in this: but I should hardly like to assent to it as it stands. The position is too complex for three lines.

¹⁵² The details in this answer are good. But you have not taken what, in my own opinion - I do not wish to speak too confidently - is the root of the matter.

Sometime ago nearly all hirings were by the year. Suppose that economic changes have set themselves against this method in the very act of raising the average wages earned in 52 weeks from £26 to £52: that during the later regime ten per cent were out of work, but no one who offered to work at 10s a week would have been "unemployed". Has employment diminished? In other words do you mean the offers of employment which the workmen do accept or those which are made to them implicitly and they might accept.

23.11.05 2. Under what conditions is it possible that an increased use of machinery may lower wages? Do such conditions exist today?

[page 1]

(i) If the use of machinery increases more rapidly than accumulations of capital, less labour will be required per unit of production and there will be insufficient capital to increase the volumes of production sufficiently to afford compensation. The demand for labour may, by this means, be temporarily diminished.¹⁵³

(ii) Machinery may, on the whole, diminish the need for highly skilled and specialized labour.¹⁵⁴ As much labour as before may be required but much of it may be of so low an order of skill as to depress certain grades of workmen into equivalence with lower grades. This will tend towards the greater equalisation of wages and to bring the average nearer the lower limit.¹⁵⁵

(iii) The wage necessary for physical efficiency may be diminished by the substitution of machinery for human muscles in the more laborious kinds of labour. Thus, if the organization of labour is incomplete, the employer may be able to obtain "cheap labour" without its becoming for him "dear labour".¹⁵⁶

(iv) The geographical movement of labour centres due to changing mechanical methods of production may cause local depression, if the mobility of labour is incomplete.¹⁵⁷

But (v) the economics due to machinery will almost always increase the real value of a given nominal wage

The most important, though perhaps more temporary, cause is

[page 2]

to be found in (i). Labour and capital assist one another, but at the same time they compete. Machinery is apt to afford a new advantage to capital in this competition where substitution between labour and capital is possible. Consequently, until the supply of capital has increased (or that of labour diminished) capital will be rewarded by a large share of the joint produce. It does not follow from this that labour is absolutely worse off than before - for there will be more to divide. Which of these tendencies gains the upper hand depends upon the particular circumstances.

¹⁵³ This is an inexact phrase. With all your professions of logical purism in the use of "capital", I find no clue to your use of it here. I can't help thinking you are using capital in the 1820 sense, when it meant labourers' necessities more than most things. If not your result seems to me invalid.

¹⁵⁴ It nearly always does. But there are three kinds of labour (i) skilled, (ii) unskilled, (iii) resourceful. A machinery often increases (iii) as well as (ii) while diminishing (i).

¹⁵⁵ "To bring the average and the lower limit nearer together" [correction by AM]. Logically your phrase is equivalent to 'will bring the lower limit nearer to the average' but the suggestions of the two phrases differ, and your suggestion seems to be in the wrong direction.

¹⁵⁶ I am about midway between Cree [T.S. Cree, *A Criticism of the Theory of Trade Unions*, 1891] who thinks that organization has practically no effect in the long run on wages and the Webbs [S. and B. Webb, *History of Trade Unionism*, 1894] who think it has a great deal. The phrase which you have used is rather too strong for me. But I do push my own opinion.

¹⁵⁷ ["Incomplete" is underlined by Marshall] Nowadays it is a cynical trade union boast that the unionists can follow in a day trade which they have spent half a generation in driving away. E.g. ship or engineering trade of Poplar etc.

While (ii) and (iii) may have diminished the wages in particular industries, and (iv) in particular localities, it is not to be supposed that on the whole any of the above tendencies have any appreciable influence at the present time. Skilled labour may be flowing from special trades, and labour in general from special places, as fast as circumstances allow. But the responsibility which is involved in the case of delicate machinery has counterbalanced the diminished necessity for highly skilled manual labour and has at least maintained the numerical proportions between the various grades, nor has machinery tended to lower the real wage of given grades.¹⁵⁸

¹⁵⁸ A good answer, but you have not considered cases such as that of France about 1785, where the advance of the costs of production affected almost exclusively goods consumed by the well-to-do only.

23.11.05. 3. How is the output of a monopolistic industry likely to be affected if, having hitherto been allowed to discriminate between its customers, it is prevented by law from doing this?

What light does your answer throw on the problem of governmental interference with the rates charged by railway companies?

[page 1]

In general the output might theoretically be affected in any direction, increasing diminishing or remaining stationary, by the prevention of discrimination. But the more legitimate discriminations, the prevention of which might diminish output, are not likely in actual practice to be those which could be called discriminations between customers - that is to say, if we mean to exclude discriminations between localities and allowances for large quantity if this allowance is granted indiscriminately to all offering that quantity. I will deal first with these "illegitimate" discriminations of which American railway[s] are the signal instance.

They are usually granted: (i) corruptly - either by bribery of officials or through the illegitimate influence of directors who have private ends to gain or (ii) in return for real or supposed special services - e.g. if the customer in whose favour discriminations are made is willing to act as "evener", or to distribute the pressure of his custom in a manner most convenient to the company or (iii) because of real or supposed special economies - e.g. in the special terminal arrangements.

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In so far as real economies are involved discrimination may increase the output - by making special services profitable which would not be profitable if an unvarying tariff were charged.¹⁵⁹

This is allied to the more "legitimate" discriminations which may benefit the consumer as well as the monopolist, of which a medical practitioner's sliding tariff is a good instance. These discriminations consist in an attempt to mulct the unusually large consumer's surpluses of particular individuals or - more often - of particular classes; and to make those persons who would, under a uniform tariff, enjoy a large surplus pay the greater part of the fixed charges, while with this assistance a cheap service paying little more than special charges is developed for those customers who must have a cheap service or none. In the monopolist's heaven where he knows all and can discriminate without limit, he would probably be able to reduce consumer's surplus to very small proportions. And indeed it would certainly be the duty of a socialist state to attempt these manipulations, which would prove one of the most powerful means of counteracting undesirable inequalities of distribution. But even in the case of a monopolist to-day, seeking maximum profits, this type of discrimination may increase his output and incidentally

¹⁵⁹ I myself hold that a "discrimination" by which a man receives part payment for the assistance he renders to the company, is no discrimination at all. I admit however that it may be used by knaves as a cloak for various evils, and that it may be necessary to prohibit in some cases on grounds similar to those on which prohibition of private traffic[k]ing in postage stamps is forbidden.

benefit the public at large. In the case of the doctor this is plainly so; whether Messrs Matthew's discrimination between (a) undergraduates, (b) unmarried M.A.S. (c) married M.A.S.¹⁶⁰ are equally satisfactory is more open to question.¹⁶¹

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Workmen's trains is an acknowledged case of justifiable and useful discriminations; it profits the railway company and the public alike.¹⁶² In the case of railway companies the foregoing argument points to a distinction between passenger and freight traffic. Discrimination amongst passengers is more likely on the whole to be between classes with differing demand schedules and to be of the second and more legitimate type;¹⁶³ whereas freight discrimination, (between customers, not between localities or commodities) is more likely to be of a corrupt or illegitimate nature.¹⁶⁴

It is true that no perfectly general rule can be laid down, but American experience certainly shows that freight discriminations of this kind are likely to be 'in restraint of trade', to diminish the output, and to harm the public by fostering one artificial monopoly the more.¹⁶⁵ These - especially in so far as they are the result of corrupt practices - would seem to be a fitting object of legislation. But with regard to the passenger traffic, the interests of the public in this matter are more likely to coincide with those of the company and in general legislation is to be discouraged. A great development of the granting of free passes, however, is dangerous to honesty and might, in some circumstances, be forbidden with specific exceptions.

T.U.

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(i) no discrimination

$$p=f(D) \text{ demand} \quad \Sigma=Q(D) \text{ cost of production}^{166}$$

D is given by

$$f(D)-Q(D)+D[f'(D)-Q'(D)]=0 \quad (i)$$

(ii) discrimination

$p_r=f_r(D_r)$ the demands of the classes or individuals
discrimination between

¹⁶⁰ [The acronym probably means Master of Arts Students.]

¹⁶¹ Does this exist now, when all pay cash? If any demand credit, there are differences of risk. But surely Matthew's price list is the same for all. Is it not? It is however true that the imperious undergraduate who insists on a special messenger being sent to his room with a pot of marmalade ought to pay for it. There may be illicit commissions. There is greater cost of delivery.

¹⁶² There is something to be said for the position that these are special services. The use of return workmen's tickets by ordinary trains is rather nearer pure discrimination.

¹⁶³ Generally these discriminations are like those between Library editions at £ 1.11.6 and popular editions at a few shillings. Any one may buy the cheap edition.

¹⁶⁴ Yes.

¹⁶⁵ This is true of one class of such discriminations. But often the chief objection to them lies in the waste of time to buyer and seller of the services caused by the bargaining; and in opportunities for dishonest treatment of the railway co[mpany]'s money by their own agents.

¹⁶⁶ A posteriori I conclude that D=amount of output: but I should never have guessed it a priori.

$$\sum D_r = D$$

the D_s are given by

$$f(D_r) - Q(D) + D_r[f'D_r - Q'D] = 0 \quad (\text{ii}) \quad \text{etc.}$$

It is plain that theoretically the value of D obtained from (ii) etc. may be \leq that obtained from (i).¹⁶⁷

¹⁶⁷ No doubt this conclusion emerged from the mathematics.

But I am certain it ought to; and as the statement of the problem seems right, I conclude that the mathematical machine, if set in work, would do its duty.

Again an excellent paper.

[No date] 6. Adam Smith says (W.N. iv.6) "When a tax on coinage is so moderate as not to encourage false coining, though everybody advances the tax nobody finally pays it, because everybody gets it back in the advanced value of the coins": Examine this,

Consider the incidence of taxes on gold mines levied

(a) universally - on all mines

(b) only on mines not yet operated - i.e. not retrospective.

And consider how the answers are modified if the tax affects only one country.

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Adam Smith's theorem is true on certain assumptions.

Take first of all an isolated country with a fixed gold supply.¹⁶⁸

So long as the coin buys more than gold in it+royalty, $c > (1+r)g$, gold is brought to be coined until equilibrium is reached

when coin buys $(1+r)g$ in it $c = (1+r)g$

Suppose now that the demand for currency (i.e. for ready purchasing power) diminishes or the demand for gold for the arts goes up

we have coin buys less than $(1+r)g$ in it $c < (1+r)g$

i.e. $c = 1/n(1+r)g$

then if $n > (1+r)$ coins are melted down.

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Now in this supposed case, if the demand for currency has decreased and the demand for the arts increased in such a way that the purchasing power of a gold coin (in the absence of a royalty) would be unchanged, it is clear that the persons through whose hands the coins passed have between them paid the amount of the tax.

If the gold supply is not fixed, and the complications of foreign trade are introduced, the same general argument holds good. As long as there is no actual passage or tendency towards passage for currency to bullion, nobody pays.¹⁶⁹

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If the tax be on all gold mines instead of on coinage, the antithesis between gold for coinage and gold for the arts is not involved.¹⁷⁰

¹⁶⁸ Jolted notes with mathematical symbols unexplained are rather vexatious: and examiners are human beings.

¹⁶⁹ I do not quite know what your symbols mean. But I think you do not want any.

I think you mean that if the coinage is so limited in amount that its market value never falls below the value of the gold in the coin + seignorage, than no one pays.

If so I agree.

But I should go further.

¹⁷⁰ [The text from "the antithesis" to "involved" is underlined by Marshall] It may be my fault; but I cannot follow you. I can't see how you can get equations without a demand curve, and that is a very complex affair partly because the currency demand and arts demand need to be treated separately not on the supply side but on the demand and especially in regard to the currency users. [This comment is cancelled by Marshall himself. See next comment.]

Suppose first of all that gold is used for currency only.¹⁷¹

$f(x)$ the cost of production of the x^{th} sovereign in a given year
 n the number of sovereigns existing at the beginning of the year
 \underline{x} the number of sovereigns mined no tax
 \underline{y} [the number of sovereigns mined] when there is a tax r .

Then $(n+x)f(x)=(n+y)[f(y)+r]$ assuming r sufficiently small not to stop mining altogether
(α) i.e. $(n+x)f(x)>nr$

The rents of mine owners are therefore decreased by

$$\int_y^x f(x)dx - ry$$

It is easily shown (by theorem of mean value) that if r satisfies condition α above this is positive. Therefore mine owners will lose. It can also be shown that each mine owner loses.¹⁷²

In addition the value of gold already mined is enhanced: so that creditors gain and debtors lose.¹⁷³

The use of gold for the arts may or may not in general tend to counteract this,¹⁷⁴ according as the total outlay of purchasing power on gold for the arts is increased or diminished by the higher price¹⁷⁵ of gold.

If the tax is only on new mines, the whole system will¹⁷⁶ be slighter; the owners of old mines will profit both by the increased price¹⁷⁷ they will obtain for the metal and from the greater intensiveness of mining which will become profitable.¹⁷⁸

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If the tax affects one country only:

(1) assuming a corresponding tax on imported gold

As long as there is no export of gold we have the case already discussed. If the country exports gold and there is no rebate, the extent to which the mine owners bear the tax depends on the proportion borne by the gold exports of the country in question to the gold supply of the world.¹⁷⁹

(2) with no import tax

If the country imports gold, unless the country is an important supplier of gold which is highly improbable on the assumption that it imports, the mine owners will bear the tax almost entirely.¹⁸⁰

¹⁷¹ I had overlooked the line beginning "Suppose first". Now I agree.

¹⁷² Yes.

¹⁷³ Good.

¹⁷⁴ ["Counteract this" is underlined by Marshall] I do not see what "this" is; and I do not follow your drift.

¹⁷⁵ ["Price" is crossed out by Marshall] Value.

¹⁷⁶ ["Will" is crossed out by Marshall] May.

¹⁷⁷ ["Price" is crossed out by Marshall] Value.

¹⁷⁸ I am not sure I should reckon these two as separate entries.

¹⁷⁹ This is not clear. For as there is no import tax on gold, and its cost of carriage is low, the p.[rice of]p.[roduction] of gold cannot move in any one country very differently from others.

¹⁸⁰ The first part is very good.

But you have not caught my drift.

It is that a general tax on mining gold, in so far as it affects only the currency user, would be a net gain

to the world by its full amount: but that as things are no country is likely to move very far in the direction of taxing gold mines, after the first bloom of them has been taken off by shrewd selectors.